wherein the measurement device is configured to generate one or more output signals responsive to the detected energy during use; and

a processor coupled to the measurement device and configured to determine at least a first property and a second property of the specimen from the one or more output signals during use, wherein the first property comprises a concentration of an element in the specimen, and wherein the second property comprises a thickness of the specimen.

3430. The system of claim 3429, wherein the stage is further configured to move laterally during use.

3431. The system of claim 3429, wherein the stage is further configured to move rotatably during use.

3432. The system of claim 3429, wherein the stage is further configured to move laterally and rotatably during use.

3433. The system of claim 3429, wherein the measurement device further comprises a photo-acoustic device.

3434. The system of claim 3429, wherein the measurement device further comprises an X-ray reflectometer.

3435. The system of claim 3429, wherein the measurement device further comprises a grazing X-ray reflectometer.

3436. The system of claim 3429, wherein the measurement device further comprises an X-ray diffractometer.

3437. The system of claim 3429, wherein the measurement device further comprises an eddy current device.

3438. The system of claim 3429, wherein the measurement device further comprises a spectroscopic ellipsometer.

3439. The system of claim 3429, wherein the measurement device further comprises an ellipsometer.

3440. The system of claim 3429, wherein the measurement device further comprises a grazing X-ray reflectometer and an optical measurement device.

3441. The system of claim 3429, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a photo-acoustic device, an X-ray reflectometer, a grazing X-ray reflectometer, an X-ray diffractometer, an eddy current device, a spectroscopic ellipsometer, and an ellipsometer.

3442. The system of claim 3429, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

3443. The system of claim 3429, wherein the processor is further configured to determine a third property of the specimen from the one or more output signals during

use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

3444. The system of claim 3443, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

3445. The system of claim 3429, wherein the system is further configured to determine at least two properties of the specimen substantially simultaneously during use.

3446. The system of claim 3429, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

3447. The system of claim 3429, wherein the measurement device further comprises an X-ray diffractometer, and wherein the X-ray diffractometer is coupled to a process tool configured to grow an epitaxial layer of silicon on the specimen.

3448. The system of claim 3429, wherein the system is coupled to a process tool.

3449. The system of claim 3429, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

3450. The system of claim 3429, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

3451. The system of claim 3429, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

3452. The system of claim 3429, wherein the system is coupled to a process tool, and wherein the stage is configured to move the specimen from the system to the process tool during use.

3453. The system of claim 3429, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen to a process chamber of the process tool during use.

3454. The system of claim 3429, wherein the system is coupled to a process tool, and wherein the system is further configured to determine at least the two properties of the specimen while the specimen is waiting between process steps.

3455. The system of claim 3429, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

3456. The system of claim 3429, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

3457. The system of claim 3429, wherein the system is coupled to a process tool, and wherein the process tool is selected from the group consisting of an etch tool, an ion implanter, a chemical vapor deposition tool, a physical vapor deposition tool, an atomic layer deposition tool, a thermal tool, a cleaning tool, and a plating tool.

3458. The system of claim 3429, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is coupled to a process tool.

3459. The system of claim 3429, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is disposed within a process tool.

3460. The system of claim 3429, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

3461. The system of claim 3429, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

3462. The system of claim 3429, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

3463. The system of claim 3462, wherein the processor is further configured to determine at least the two properties of the specimen during the process step.

3464. The system of claim 3463, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

3465. The system of claim 3463, wherein the processor is coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique during use.

3466. The system of claim 3429, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

3467. The system of claim 3466, wherein the system is further configured to determine at least the two properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

3468. The system of claim 3429, wherein the processor is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

3469. The system of claim 3429, wherein the processor is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

3470. The system of claim 3469, wherein the processor is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

3471. The system of claim 3429, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen during use.

3472. The system of claim 3429, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

3473. The system of claim 3429, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

3474. The system of claim 3429, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the processor is further configured to calibrate the measurement device using the database during use.

3475. The system of claim 3429, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the processor is further configured to monitor output signals generated by measurement device using the database during use.

3476. The system of claim 3429, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, wherein the database further comprises first and second properties of a plurality of specimens, and wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices.

3477. The system of claim 3476, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

3478. The system of claim 3476, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

3479. The system of claim 3429, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

3480. The system of claim 3429, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is

further configured to calibrate the system and at least the one additional system during use.

3481. The system of claim 3429, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

3482. The system of claim 3429, wherein the processor is further coupled to a process tool.

3483. The system of claim 3429, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

3484. The system of claim 3429, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedforward control technique during use.

3485. The system of claim 3429, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

3486. The system of claim 3485, wherein the processor is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

3487. The system of claim 3486, wherein the processor is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

3488. The system of claim 3429, wherein the processor is further coupled to a plurality of measurement devices, and wherein each of the plurality of measurement devices is coupled to a process tool.

3489. The system of claim 3429, wherein the processor is further coupled to a plurality of process tools, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to at least one of the plurality of process tools during use.

3490. The system of claim 3429, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

3491. The system of claim 3490, wherein the local processor is further configured to determine the first property and the second property of the specimen during use.

3492. The system of claim 3490, wherein the remote controller computer is further configured to determine the first property and the second property of the specimen during use.

3493. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a concentration of an element in the specimen, and wherein the second property comprises a thickness of the specimen.

3494. The method of claim 3493, further comprising laterally moving the stage during said directing energy and said detecting energy.

3495. The method of claim 3493, further comprising rotatably moving the stage during said directing energy and said detecting energy.

3496. The method of claim 3493, further comprising laterally and rotatably moving the stage during said directing energy and said detecting energy.

3497. The method of claim 3493, wherein the measurement device further comprises a photo-acoustic device.

3498. The method of claim 3493, wherein the measurement device further comprises an X-ray reflectometer.

3499. The method of claim 3493, wherein the measurement device further comprises a grazing X-ray reflectometer.

3500. The method of claim 3493, wherein the measurement device further comprises an X-ray diffractometer.

3501. The method of claim 3493, wherein the measurement device further comprises an eddy current device.

3502. The method of claim 3493, wherein the measurement device further comprises a spectroscopic ellipsometer.

3503. The method of claim 3493, wherein the measurement device further comprises an ellipsometer.

3504. The method of claim 3493, wherein the measurement device further comprises a grazing X-ray reflectometer and an optical measurement device.

3505. The method of claim 3493, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a photo-

acoustic device, an X-ray reflectometer, a grazing X-ray reflectometer, an X-ray diffractometer, an eddy current device, a spectroscopic ellipsometer, and an ellipsometer.

3506. The method of claim 3493, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

3507. The method of claim 3493, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

3508. The method of claim 3507, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

3509. The method of claim 3493, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

3510. The method of claim 3493, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

3511. The method of claim 3493, wherein the measurement device further comprises an X-ray diffractometer, and wherein the X-ray diffractometer is coupled to a process tool configured to grow an epitaxial layer of silicon on the specimen.

3512. The method of claim 3493, wherein the stage and the measurement device are coupled to a process tool.

3513. The method of claim 3493, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

3514. The method of claim 3493, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

3515. The method of claim 3493, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of an etch tool, an ion implanter, a chemical vapor deposition tool, a physical vapor deposition tool, an atomic layer deposition tool, a thermal tool, a cleaning tool, and a plating tool.

3516. The method of claim 3493, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

3517. The method of claim 3493, wherein the stage and the measurement device are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to said directing and said detecting using the stage.

3518. The method of claim 3493, wherein the stage and the measurement device are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

3519. The method of claim 3493, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

3520. The method of claim 3493, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

3521. The method of claim 3493, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

3522. The method of claim 3493, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

3523. The method of claim 3493, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

3524. The method of claim 3493, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

3525. The method of claim 3493, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

3526. The method of claim 3525, further comprising performing said directing and said detecting during the process step.

3527. The method of claim 3526, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

3528. The method of claim 3526, further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

3529. The method of claim 3493, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

3530. The method of claim 3529, further comprising performing said directing and said detecting during said moving the specimen from the first process chamber to the second process chamber.

3531. The method of claim 3493, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

3532. The method of claim 3493, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

3533. The method of claim 3532, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

3534. The method of claim 3493, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined first and second properties of the specimen.

3535. The method of claim 3493, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

3536. The method of claim 3493, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

3537. The method of claim 3493, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising calibrating the measurement device using the database.

3538. The method of claim 3493, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising monitoring output signals of the measurement device using the database.

3539. The method of claim 3493, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

3540. The method of claim 3539, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

3541. The method of claim 3539, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

3542. The method of claim 3493, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

3543. The method of claim 3493, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

3544. The method of claim 3493, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

3545. The method of claim 3493, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedback control technique.

3546. The method of claim 3493, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedforward control technique.

3547. The method of claim 3493, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

3548. The method of claim 3547, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters.

3549. The method of claim 3548, further comprising altering a parameter of at least one of the instruments in response to the relationship.

3550. The method of claim 3493, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to at least one of the determined properties of the specimen.

3551. The method of claim 3493, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

3552. The method of claim 3551, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

3553. The method of claim 3551, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

3554. A computer-implemented method for controlling a system configured to determine at least two properties of a specimen during use, wherein the system comprises a measurement device, comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, and wherein the measurement device is coupled to a stage, comprising:

controlling the illumination system to direct energy toward a surface of the specimen;

controlling the detection system to detect energy propagating from the surface of the specimen; and

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a concentration of an element in the specimen, and wherein the second property comprises a thickness of the specimen.

3555. The method of claim 3554, further comprising controlling the stage, wherein the stage is configured to support the specimen.

3556. The method of claim 3554, further comprising controlling the stage to laterally move the stage during said directing energy and said detecting energy.

3557. The method of claim 3554, further comprising controlling the stage to rotatably move the stage during said directing energy and said detecting energy.

3558. The method of claim 3554, further comprising controlling the stage to laterally and rotatably move the stage during said directing energy and said detecting energy.

3559. The method of claim 3554, wherein the measurement device further comprises a photo-acoustic device.

3560. The method of claim 3554, wherein the measurement device further comprises an X-ray reflectometer.

3561. The method of claim 3554, wherein the measurement device further comprises a grazing X-ray reflectometer.

3562. The method of claim 3554, wherein the measurement device further comprises an X-ray diffractometer.

3563. The method of claim 3554, wherein the measurement device further comprises an eddy current device.

3564. The method of claim 3554, wherein the measurement device further comprises a spectroscopic ellipsometer.

3565. The method of claim 3554, wherein the measurement device further comprises an ellipsometer.

3566. The method of claim 3554, wherein the measurement device further comprises a grazing X-ray reflectometer and an optical measurement device.

3567. The method of claim 3554, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a photo-acoustic device, an X-ray reflectometer, a grazing X-ray reflectometer, an X-ray diffractometer, an eddy current device, a spectroscopic ellipsometer, and an ellipsometer.

3568. The method of claim 3554, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

3569. The method of claim 3554, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

3570. The method of claim 3569, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

3571. The method of claim 3554, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

3572. The method of claim 3554, further comprising controlling the illumination system to direct energy toward multiple locations on the surface of the specimen substantially simultaneously and controlling the detection system to detect energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

3573. The method of claim 3554, wherein the measurement device further comprises an X-ray diffractometer, and wherein the X-ray diffractometer is coupled to a process tool configured to grow an epitaxial layer of silicon on the specimen.

3574. The method of claim 3554, wherein the stage and the measurement device are coupled to a process tool.

3575. The method of claim 3554, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

3576. The method of claim 3554, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

3577. The method of claim 3554, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of an etch tool, an ion implanter, a chemical vapor deposition too, a physical vapor deposition tool, an atomic layer deposition tool, a thermal tool, a cleaning tool, and a plating tool.

3578. The method of claim 3554, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage, and wherein the wafer handler is coupled to the process tool.

3579. The method of claim 3554, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling the stage to move the specimen from the system to the process tool.

3580. The method of claim 3554, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage such that at least the two properties of the specimen can be determined while the specimen is waiting between process steps.

3581. The method of claim 3554, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

3582. The method of claim 3554, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

3583. The method of claim 3554, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

3584. The method of claim 3554, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

3585. The method of claim 3554, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

3586. The method of claim 3554, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

3587. The method of claim 3554, further comprising disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

3588. The method of claim 3587, further comprising controlling the illumination system and controlling the detection system during the process step.

3589. The method of claim 3588, further comprising controlling the system to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

3590. The method of claim 3588, further comprising controlling the system to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

3591. The method of claim 3554, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

3592. The method of claim 3591, further comprising controlling the illumination system and controlling the detection system during said moving the specimen from the first process chamber to the second process chamber.

3593. The method of claim 3554, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

3594. The method of claim 3554, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

3595. The method of claim 3594, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

3596. The method of claim 3554, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

3597. The method of claim 3554, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

3598. The method of claim 3554, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

3599. The method of claim 3554, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising calibrating the measurement device using the database.

3600. The method of claim 3554, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising monitoring output signals of the measurement device using the database.

3601. The method of claim 3554, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, wherein the database further comprises first and second properties of a plurality of specimens.

3602. The method of claim 3601, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

3603. The method of claim 3601, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

3604. The method of claim 3554, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand

alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

3605. The method of claim 3554, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

3606. The method of claim 3554, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

3607. The method of claim 3554, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedback control technique.

3608. The method of claim 3554, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedforward control technique.

3609. The method of claim 3554, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

3610. The method of claim 3609, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters.

3611. The method of claim 3610, further comprising altering a parameter of at least one of the instruments in response to the relationship.

3612. The method of claim 3554, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to at least one of the determined properties of the specimen.

3613. The method of claim 3554, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

3614. The method of claim 3613, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

3615. The method of claim 3613, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

3616. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a concentration of an element in the specimen, and wherein the second property comprises a thickness of the specimen.

3617. The device of claim 3616, wherein the measurement device further comprises a photo-acoustic device.

3618. The device of claim 3616, wherein the measurement device further comprises an X-ray reflectometer.

3619. The device of claim 3616, wherein the measurement device further comprises a grazing X-ray reflectometer.

3620. The device of claim 3616, wherein the measurement device further comprises an X-ray diffractometer.

3621. The device of claim 3616, wherein the measurement device further comprises an eddy current device.

3622. The device of claim 3616, wherein the measurement device further comprises a spectroscopic ellipsometer.

3623. The device of claim 3616, wherein the measurement device further comprises an ellipsometer.

3624. The device of claim 3616, wherein the measurement device further comprises a grazing X-ray reflectometer and an optical measurement device.

3625. The device of claim 3616, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a photo-acoustic device, an X-ray reflectometer, a grazing X-ray reflectometer, an X-ray diffractometer, an eddy current device, a spectroscopic ellipsometer, and an ellipsometer.

3626. The device of claim 3616, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

3627. The device of claim 3616, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

3628. The device of claim 3627, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

3629. The device of claim 3616, wherein the measurement device further comprises an X-ray diffractometer, and wherein the X-ray diffractometer is coupled to a process tool configured to grow an epitaxial layer of silicon on the specimen.

3630. The device of claim 3616, wherein the stage and the measurement device are coupled to a process tool.

3631. The device of claim 3616, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of an etch tool, an ion implanter, a chemical vapor deposition tool, a physical vapor deposition tool, an atomic layer deposition tool, a thermal tool, a cleaning tool, and a plating tool.

3632. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a concentration of an element in the specimen, and wherein the second property comprises a thickness of the specimen.

3633. The method of claim 3632, wherein the measurement device further comprises a photo-acoustic device.

3634. The method of claim 3632, wherein the measurement device further comprises an X-ray reflectometer.

3635. The method of claim 3632, wherein the measurement device further comprises a grazing X-ray reflectometer.

3636. The method of claim 3632, wherein the measurement device further comprises an X-ray diffractometer.

3637. The method of claim 3632, wherein the measurement device further comprises an eddy current device.

3638. The method of claim 3632, wherein the measurement device further comprises a spectroscopic ellipsometer.

3639. The method of claim 3632, wherein the measurement device further comprises an ellipsometer.

3640. The method of claim 3632, wherein the measurement device further comprises a grazing X-ray reflectometer and an optical measurement device.

3641. The method of claim 3632, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a photo-acoustic device, an X-ray reflectometer, a grazing X-ray reflectometer, an X-ray diffractometer, an eddy current device, a spectroscopic ellipsometer, and an ellipsometer.

3642. The method of claim 3632, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

3643. The method of claim 3632, wherein the measurement device further comprises an X-ray diffractometer, and wherein the X-ray diffractometer is coupled to a process tool configured to grow an epitaxial layer of silicon on the specimen.

3644. The method of claim 3632, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

3645. The method of claim 3644, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

3646. The method of claim 3632, wherein the stage and the measurement device are coupled to a process tool.

3647. The method of claim 3632, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of an etch tool, an ion implanter, a chemical vapor deposition tool, a physical vapor deposition tool, an atomic layer deposition tool, a thermal tool, a cleaning tool, and a plating tool.

3648. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals responsive to the detected energy during use;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine a first property and a second property of the specimen from the at least partially processed one or more output signals during use, wherein the first property comprises a concentration of an element in the specimen, and wherein the second property comprises a thickness of the specimen.

3649. The system of claim 3648, wherein the measurement device further comprises a photo-acoustic device.

3650. The system of claim 3648, wherein the measurement device further comprises an X-ray reflectometer.

3651. The system of claim 3648, wherein the measurement device further comprises a grazing X-ray reflectometer.

3652. The system of claim 3648, wherein the measurement device further comprises an X-ray diffractometer.

3653. The system of claim 3648, wherein the measurement device further comprises an eddy current device.

3654. The system of claim 3648, wherein the measurement device further comprises a spectroscopic ellipsometer.

3655. The system of claim 3648, wherein the measurement device further comprises an ellipsometer.

3656. The system of claim 3648, wherein the measurement device further comprises a grazing X-ray reflectometer and an optical measurement device.

3657. The system of claim 3648, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a photo-acoustic device, an X-ray reflectometer, a grazing X-ray reflectometer, an X-ray diffractometer, an eddy current device, a spectroscopic ellipsometer, and an ellipsometer.

3658. The system of claim 3648, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

3659. The system of claim 3648, wherein the remote controller computer is further configured to determine a third property of the specimen from the at least partially processed one or more output signals during use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

3660. The system of claim 3659, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

3661. The system of claim 3648, wherein the measurement device further comprises an X-ray diffractometer, and wherein the X-ray diffractometer is coupled to a process tool configured to grow an epitaxial layer of silicon on the specimen.

3662. The system of claim 3648, wherein the remote controller computer is further coupled to a process tool.

3663. The system of claim 3648, wherein the remote controller computer is further coupled to a process tool, and wherein the process tool is selected from a group consisting of an etch tool, an ion implanter, a chemical vapor deposition tool, a physical vapor deposition tool, an atomic layer deposition tool, a thermal tool, a cleaning tool, and a plating tool.

3664. The system of claim 3648, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

3665. The system of claim 3648, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in

response to at least one of the determined properties using a feedforward control technique during use.

3666. The system of claim 3648, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

3667. The system of claim 3666, wherein the remote controller computer is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

3668. The system of claim 3667, wherein the remote controller computer is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

3669. The system of claim 3648, wherein the illumination system is further configured to direct energy toward the surface of the specimen during a process step, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during the process step, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during the process step.

3670. The system of claim 3669, wherein the remote controller computer is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

3671. The system of claim 3669, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique during use.

3672. The system of claim 3648, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

3673. The system of claim 3672, wherein the illumination system is further configured to direct energy toward the surface of the specimen during said moving, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during said moving, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during said moving.

3674. The system of claim 3648, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

3675. The system of claim 3648, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

3676. The system of claim 3675, wherein the remote controller computer is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

3677. The system of claim 3648, wherein the remote controller computer is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen during use.

3678. The system of claim 3648, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

3679. The system of claim 3648, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

3680. The system of claim 3648, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the remote controller computer is further configured to calibrate the measurement device using the database during use.

3681. The system of claim 3648, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the remote controller computer is further configured to monitor output signals generated by measurement device using the database during use.

3682. The system of claim 3648, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

3683. The system of claim 3682, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

3684. The system of claim 3682, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

3685. The system of claim 3648, wherein the remote controller computer is further coupled to a plurality of measurement devices, and wherein at least one of the plurality of measurement devices is coupled to a process tool.

3686. The system of claim 3648, wherein the remote controller computer is further coupled to a plurality of process tools, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to at least one of the plurality of process tools during use.

3687. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a concentration of an element in the specimen, and wherein the second property comprises a thickness of the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

3688. The method of claim 3687, wherein the measurement device further comprises a photo-acoustic device.

3689. The method of claim 3687, wherein the measurement device further comprises an X-ray reflectometer.

3690. The method of claim 3687, wherein the measurement device further comprises a grazing X-ray reflectometer.

3691. The method of claim 3687, wherein the measurement device further comprises an X-ray diffractometer.

3692. The method of claim 3687, wherein the measurement device further comprises an eddy current device.

3693. The method of claim 3687, wherein the measurement device further comprises a spectroscopic ellipsometer.

3694. The method of claim 3687, wherein the measurement device further comprises an ellipsometer.

3695. The method of claim 3687, wherein the measurement device further comprises a grazing X-ray reflectometer and an optical measurement device.

3696. The method of claim 3687, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a photo-acoustic device, an X-ray reflectometer, a grazing X-ray reflectometer, an X-ray diffractometer, an eddy current device, a spectroscopic ellipsometer, and an ellipsometer.

3697. The method of claim 3687, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

3698. The method of claim 3687, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

3699. The method of claim 3698, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

3700. The method of claim 3687, wherein the measurement device further comprises an X-ray diffractometer, and wherein the X-ray diffractometer is coupled to a process tool configured to grow an epitaxial layer of silicon on the specimen.

3701. The method of claim 3687, wherein the remote controller computer is coupled to a process tool.

3702. The method of claim 3687, wherein the remote controller computer is coupled to a process tool, and wherein the process tool is selected from the group consisting of an etch tool, an ion implanter, a chemical vapor deposition tool, a physical vapor deposition tool, an atomic layer deposition tool, a thermal tool, a cleaning tool, and a plating tool.

3703. The method of claim 3687, wherein the remote controller computer is coupled to a process tool, the method further comprising altering a parameter of one or more

instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties using a feedback control technique.

3704. The method of claim 3687, wherein the remote controller computer is coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen using a feedforward control technique.

3705. The method of claim 3687, wherein the remote controller computer is coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer.

3706. The method of claim 3705, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters using the remote controller computer.

3707. The method of claim 3705, further comprising altering a parameter of at least one of the instruments in response to the relationship using the remote controller computer.

3708. The method of claim 3687, wherein the illumination system and the detection system are coupled to a process chamber of the process tool, the method further comprising performing said directing and said detecting during a process step.

3709. The method of claim 3708, further comprising obtaining a signature characterizing the process step using the remote controller computer, wherein the signature comprises at least one singularity representative of an end of the process step.

3710. The method of claim 3708, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties using an in situ control technique.

3711. The method of claim 3687, further comprising:

moving the specimen from a first process chamber to a second process chamber using the stage; and

performing said directing and said detecting during said moving the specimen.

3712. The method of claim 3687, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens using the remote controller computer.

3713. The method of claim 3687, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property using the remote controller computer.

3714. The method of claim 3713, further comprising generating an output signal using the remote controller computer if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

3715. The method of claim 3687, wherein the remote controller computer is coupled to the measurement device.

3716. The method of claim 3687, wherein the remote controller computer is coupled to the measurement device, the method further comprising altering a sampling frequency of

the measurement device using the remote controller computer in response to at least one of the determined properties of the specimen.

3717. The method of claim 3687, wherein the remote controller computer is coupled to the measurement device, the method further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedback control technique.

3718. The method of claim 3687, wherein the remote controller computer is coupled to the measurement device, the method further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedforward control technique.

3719. The method of claim 3687, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen, the method further comprising calibrating the measurement device using the remote controller computer and the database.

3720. The method of claim 3687, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen, the method further comprising monitoring output signals of the measurement device using the remote controller computer and the database.

3721. The method of claim 3687, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and

second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

3722. The method of claim 3721, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the remote controller computer and the database.

3723. The method of claim 3721, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the remote controller computer and the database.

3724. The method of claim 3687, further comprising sending the at least partially processed one or more output signals from a plurality of local processors to the remote controller computer, wherein at least one of the plurality of local processors is coupled a measurement device.

3725. The method of claim 3724, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices using the remote controller computer in response to at least one of the determined properties of the specimen.

3726. The method of claim 3725, wherein at least one of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

3727. The method of claim 3725, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of process tools using the remote

controller computer in response to at least one of the determined properties of the specimen.

3728. A system configured to determine at least one characteristic of a layer on a specimen during use, comprising:

a deposition tool configured to form the layer of material on the specimen during use;

a measurement device coupled to the deposition tool, comprising:

an illumination system configured to direct light toward a surface of the specimen use;

a detection system coupled to the illumination system and configured to detect light propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals in response to the detected light during use; and

wherein the illumination system and the detection system are further configured such that the measurement device comprises at least a spectroscopic reflectometer and a spectroscopic ellipsometer; and

a processor coupled to the measurement device and configured to determine a characteristic of the layer from the one or more output signals during use.

3729. The system of claim 3728, further comprising a stage coupled to the measurement device, and wherein the stage is configured to move laterally during use.

3730. The system of claim 3728, further comprising a stage coupled to the measurement device, and wherein the stage is configured to move rotatably during use.

3731. The system of claim 3728, further comprising a stage coupled to the measurement device, and wherein the stage is configured to move laterally and rotatably during use.

3732. The system of claim 3728, wherein the illumination system comprises a single light source.

3733. The system of claim 3728, wherein the illumination system comprises more than one light source.

3734. The system of claim 3728, wherein the detection system comprises a single light sensitive device.

3735. The system of claim 3728, wherein the detection system comprises more than one light sensitive devices.

3736. The system of claim 3728, wherein optical elements of the spectroscopic reflectometer comprise optical elements of the spectroscopic ellipsometer.

3737. The system of claim 3728, wherein the characteristic is selected from the group consisting of a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a presence of defects.

3738. The system of claim 3728, wherein the processor is further configured to determine one or more characteristics of the layer, and wherein the one or more

characteristics are selected from the group consisting of a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a presence of defects.

3739. The system of claim 3728, wherein the processor is further configured to determine an additional characteristic of the specimen from the one or more output signals during use, and wherein the additional characteristic is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

3740. The system of claim 3739, wherein the deposition tool comprises an atomic layer deposition tool.

3741. The system of claim 3728, wherein the measurement device further comprises an eddy current device.

3742. The system of claim 3728, wherein the measurement device further comprises an eddy current device, and wherein the deposition tool comprises an atomic layer deposition tool.

3743. The system of claim 3728, wherein the processor is further configured to determine at least two characteristics of the layer substantially simultaneously during use.

3744. The system of claim 3728, wherein the illumination system is further configured to direct light to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect light propagating from the multiple locations on the surface of the specimen substantially simultaneously such that at least the one characteristic of the layer on the specimen can be determined at the multiple locations substantially simultaneously.

3745. The system of claim 3728, wherein the measurement device is further coupled to a process chamber of the deposition tool.

3746. The system of claim 3728, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool.

3747. The system of claim 3728, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool, and wherein the deposition tool comprises a wafer handler configured to move the specimen to a stage coupled to the measurement device during use.

3748. The system of claim 3728, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool, and wherein a stage coupled to the measurement device is configured to move the specimen from the measurement device to the deposition tool during use.

3749. The system of claim 3728, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool, and wherein a stage coupled to the measurement device is configured to move the specimen to the process chamber of the deposition tool during use.

3750. The system of claim 3728, wherein the system is further configured to determine at least the one characteristic of the layer on the specimen while the specimen is waiting between process steps.

3751. The system of claim 3728, wherein the deposition tool comprises a support device configured to support the specimen during a deposition process step, and wherein an

upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the measurement device.

3752. The system of claim 3728, wherein the deposition tool comprises a support device configured to support the specimen during a deposition process step, and wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the measurement device.

3753. The system of claim 3728, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the deposition tool.

3754. The system of claim 3728, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the deposition tool.

3755. The system of claim 3728, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, and wherein the stage is configured to support the specimen during a deposition process step.

3756. The system of claim 3728, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, and wherein the processor is further configured to determine the characteristic of the specimen during a deposition process step.

3757. The system of claim 3728, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, and wherein the processor is further configured to obtain a signature characterizing formation of the layer during

use, wherein the signature comprises at least one singularity representative of an end of the formation of the layer.

3758. The system of claim 3728, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, wherein the processor is coupled to the deposition tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the deposition tool in response to the determined characteristic using an in situ control technique during use.

3759. The system of claim 3728, wherein the deposition tool comprises a first process chamber and a second process chamber, and wherein a stage coupled to the measurement device is configured to move the specimen from the first process chamber to the second process chamber during use.

3760. The system of claim 3728, wherein the deposition tool comprises a first process chamber and a second process chamber, wherein a stage coupled to the measurement device is configured to move the specimen from the first process chamber to the second process chamber during use, and wherein the processor is further configured to determine the characteristic of the layer as the stage is moving the specimen from the first process chamber to the second process chamber.

3761. The system of claim 3728, wherein the processor is further configured to compare the determined characteristic of the layer and characteristics of a plurality of layers during use.

3762. The system of claim 3728, wherein the processor is further configured to compare the determined characteristic of the layer to a predetermined range for the characteristic during use.

3763. The system of claim 3728, wherein the processor is further configured to compare the determined characteristic of the layer to a predetermined range for the characteristic during use, and wherein the processor is further configured to generate an output signal if the determined characteristic of the layer is outside of the predetermined range for the characteristic during use.

3764. The system of claim 3728, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to the determined characteristic of the layer during use.

3765. The system of claim 3728, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined characteristic using a feedback control technique during use.

3766. The system of claim 3728, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined characteristic using a feedforward control technique during use.

3767. The system of claim 3728, wherein the processor is further configured to generate a database during use, and wherein the database comprises the determined characteristic of the layer.

3768. The system of claim 3728, wherein the processor is further configured to generate a database during use, and wherein the processor is further configured to calibrate the measurement device using the database during use.

3769. The system of claim 3728, wherein the processor is further configured to generate a database during use, and wherein the processor is further configured to monitor output signals generated by measurement device using the database during use.

3770. The system of claim 3728, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined characteristic of the layer and characteristics of a plurality of layers, and wherein the characteristics of the plurality of layers are determined using the measurement device.

3771. The system of claim 3728, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined characteristic of the layer and characteristics of a plurality of layers, and wherein the characteristics of the plurality of layers are determined using a plurality of measurement devices.

3772. The system of claim 3771, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

3773. The system of claim 3771, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

3774. The system of claim 3728, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

3775. The system of claim 3728, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

3776. The system of claim 3728, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

3777. The system of claim 3728, wherein the processor is further coupled to the deposition tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the deposition tool in response to the determined characteristic using a feedback control technique during use.

3778. The system of claim 3728, wherein the processor is further coupled to the deposition tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the deposition tool in response to the determined characteristic using a feedforward control technique during use.

3779. The system of claim 3728, wherein the processor is further coupled to the deposition tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the deposition tool during use.

3780. The system of claim 3728, wherein the processor is further coupled to the deposition tool, wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the deposition tool during use, and wherein the processor is further configured to determine a relationship between the determined characteristic and at least one of the monitored parameters during use.

3781. The system of claim 3728, wherein the processor is further coupled to the deposition tool, wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the deposition tool during use, wherein the processor is further configured to determine a relationship between the determined characteristic and at least one of the monitored parameters during use, and wherein the processor is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

3782. The system of claim 3728, wherein the processor is further coupled to a plurality of measurement devices, and wherein each of the plurality of measurement devices is coupled to one of a plurality of semiconductor fabrication process tools.

3783. The system of claim 3728, wherein the processor is further coupled to a plurality of deposition tools, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the plurality of deposition tools during use.

3784. The system of claim 3728, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

3785. The system of claim 3784, wherein the local processor is further configured to determine the characteristic of the layer during use.

3786. The system of claim 3784, wherein the remote controller computer is further configured to determine the characteristic of the layer during use.

3787. A method for determining at least one characteristic of a layer on a specimen, comprising:

forming the layer of material upon the specimen with a deposition tool;

directing light toward a surface of the specimen using an illumination system;

detecting light propagating from the surface of the specimen using a detection system, wherein the illumination system and the detection system are arranged in a measurement device comprising at least a spectroscopic reflectometer and a spectroscopic ellipsometer, and wherein the measurement device is coupled to the deposition tool;

generating one or more output signals responsive to the detected light; and

processing the one or more output signals to determine a characteristic of the layer.

3788. The method of claim 3787, further comprising laterally moving the stage during said directing light and said detecting light.

3789. The method of claim 3787, further comprising rotatably moving the stage during said directing light and said detecting light.

3790. The method of claim 3787, further comprising laterally and rotatably moving the stage during said directing light and said detecting light.

3791. The method of claim 3787, wherein the illumination system comprises a single light source.

3792. The method of claim 3787, wherein the illumination system comprises more than one light source.

3793. The method of claim 3787, wherein the detection system comprises a single light sensitive device.

3794. The method of claim 3787, wherein the detection system comprises more than one light sensitive device.

3795. The method of claim 3787, wherein optical elements of the spectroscopic reflectometer comprise optical elements of the spectroscopic ellipsometer.

3796. The method of claim 3787, wherein the characteristic is selected from the group comprising a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a presence of defects.

3797. The method of claim 3787, wherein the processor is further configured to determine one or more characteristics of the layer, and wherein the one or more

characteristics are selected from the group comprising a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a presence of defects.

3798. The method of claim 3787, further comprising processing the one or more output signals to determine an additional characteristic of the specimen, wherein the additional characteristic is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

3799. The method of claim 3798, wherein the deposition tool comprises an atomic layer deposition tool.

3800. The method of claim 3787, wherein the measurement device further comprises an eddy current device.

3801. The method of claim 3787, wherein the measurement device further comprises an eddy current device, and wherein the deposition tool comprises an atomic layer deposition tool.

3802. The method of claim 3787, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two characteristics of the layer substantially simultaneously.

3803. The method of claim 3787, further comprising directing light toward multiple locations on the surface of the specimen substantially simultaneously and detecting light propagating from the multiple locations substantially simultaneously such that the at least one characteristic of the layer on the specimen can be determined at the multiple locations substantially simultaneously.

3804. The method of claim 3787, wherein the measurement device is further coupled to a process chamber of the deposition tool.

3805. The method of claim 3787, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool.

3806. The method of claim 3787, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool, the method further comprising moving the specimen to a stage coupled to the measurement device with a wafer handler of the deposition tool.

3807. The method of claim 3787, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool, the method further comprising moving the specimen from the measurement device to the deposition tool with a stage coupled to the measurement device.

3808. The method of claim 3787, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool, the method further comprising moving the specimen to the process chamber of the deposition tool with a stage coupled to the measurement device.

3809. The method of claim 3787, further comprising determining at least the one characteristic of the layer while the specimen is waiting between process steps.

3810. The method of claim 3787, further comprising supporting the specimen during a deposition process step with a support device of the deposition tool, wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the measurement device.

3811. The method of claim 3787, further comprising supporting the specimen during a deposition process step with a support device of the deposition tool, wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the measurement device.

3812. The method of claim 3787, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the deposition tool.

3813. The method of claim 3787, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the deposition tool.

3814. The method of claim 3787, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, the method further comprising supporting the specimen during a deposition process step with the stage.

3815. The method of claim 3787, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, and wherein processing the one or more output signals comprises determining the characteristic of the specimen during a deposition process.

3816. The method of claim 3787, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, the method further comprising obtaining a signature characterizing the formation of the layer, wherein the signature comprises at least one singularity representative of an end of the formation of the layer.

3817. The method of claim 3787, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, the method further comprising altering a parameter of one or more instruments coupled to the deposition tool in response to the determined characteristic using an in situ control technique.

3818. The method of claim 3787, wherein the deposition tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the measurement device.

3819. The method of claim 3787, wherein the deposition tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the measurement device, directing light during said moving, and detecting light during said moving.

3820. The method of claim 3787, further comprising comparing the determined characteristic and determined characteristics of a plurality of specimens.

3821. The method of claim 3787, further comprising comparing the determined characteristic to a predetermined range for the characteristic.

3822. The method of claim 3787, further comprising comparing the determined characteristic to a predetermined range for the characteristic and generating an output signal if the determined characteristic is outside of the predetermined range.

3823. The method of claim 3787, further comprising altering a sampling frequency of the measurement device in response to the determined characteristic of the layer.

3824. The method of claim 3787, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined characteristic using a feedback control technique.

3825. The method of claim 3787, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined characteristic using a feedforward control technique.

3826. The method of claim 3787, further comprising generating a database, wherein the database comprises the determined characteristic of the layer.

3827. The method of claim 3787, further comprising generating a database comprising the determined characteristic of the layer and calibrating the measurement device using the database.

3828. The method of claim 3787, further comprising generating a database comprising the determined characteristic of the layer and monitoring output signals of the measurement device using the database.

3829. The method of claim 3787, further comprising generating a database comprising the determined characteristic of the layer and determined characteristics of a plurality of layers.

3830. The method of claim 3787, further comprising generating a database comprising the determined characteristic of the layer and determined characteristics of a plurality of

layers, wherein the determined characteristics of the plurality of layers are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

3831. The method of claim 3787, further comprising generating a database comprising the determined characteristic of the layer and determined characteristics of a plurality of layers, wherein the determined characteristics of the plurality of layers are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

3832. The method of claim 3787, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

3833. The method of claim 3787, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

3834. The method of claim 3787, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

3835. The method of claim 3787, further comprising altering a parameter of one or more instruments coupled to the deposition tool in response to the determined characteristic using a feedback control technique.

3836. The method of claim 3787, further comprising altering a parameter of one or more instruments coupled to the deposition tool in response to the determined characteristic using a feedforward control technique.

3837. The method of claim 3787, further comprising monitoring a parameter of one or more instruments coupled to the deposition tool.

3838. The method of claim 3787, further comprising monitoring a parameter of one or more instruments coupled to the deposition tool and determining a relationship between the determined characteristic and at least one of the monitored parameters.

3839. The method of claim 3787, further comprising monitoring a parameter of one or more instruments coupled to the deposition tool, determining a relationship between the determined characteristic and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

3840. The method of claim 3787, further comprising altering a parameter of one or more instruments coupled to at least one semiconductor fabrication process tool in response to the determined characteristic of the layer.

3841. The method of claim 3787, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

3842. The method of claim 3841, wherein at least partially processing the one or more output signals comprises determining the characteristic of the layer.

3843. The method of claim 3841, wherein further processing the partially processed one or more output signals comprises determining the characteristic of the layer.

3844. A computer-implemented method for controlling a system configured to determine at least one characteristic of a layer on a specimen during use, wherein the system comprises a measurement device coupled to a deposition tool, and wherein the deposition tool is configured to form the layer of material on the specimen during use, the method comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, and wherein the illumination system and the detection system are configured such that the measurement device comprises a spectroscopic reflectometer and a spectroscopic ellipsometer, comprising:

controlling the illumination system to direct light toward a surface of the specimen;

controlling the detection system to detect light propagating from the surface of the specimen; and

generating one or more output signals responsive to the detected light; and

processing the one or more output signals to determine a characteristic of the layer.

3845. The method of claim 3844, wherein the system further comprises a stage coupled to the measurement device, the method further comprising supporting the specimen with the stage and controlling the stage to move laterally during said controlling the illumination system and said controlling the detection system.

3846. The method of claim 3844, wherein the system further comprises a stage coupled to the measurement device, the method further comprising supporting the specimen with the stage and controlling the stage to move rotatably during said controlling the illumination system and said controlling the detection system.

3847. The method of claim 3844, wherein the system further comprises a stage coupled to the measurement device, the method further comprising supporting the specimen with the stage and controlling the stage to move laterally and rotatably during said controlling the illumination system and said controlling the detection system.

3848. The method of claim 3844, wherein the illumination system comprises a single light source.

3849. The method of claim 3844, wherein the illumination system comprises more than one light sources.

3850. The method of claim 3844, wherein the detection system comprises a single light sensitive device.

3851. The method of claim 3844, wherein the detection system comprises more than one light sensitive devices.

3852. The method of claim 3844, wherein optical elements of the spectroscopic reflectometer comprise optical elements of the spectroscopic ellipsometer.

3853. The method of claim 3844, wherein the characteristic is selected from the group consisting of a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a presence of defects.

3854. The method of claim 3844, further comprising processing the one or more output signals to determine one or more characteristics of the layers, and wherein the one or more characteristics of the layer are selected from the group consisting of a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a presence of defects.

3855. The method of claim 3844, further comprising processing the one or more output signals to determine an additional characteristic of the specimen, wherein the additional characteristic is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

3856. The method of claim 3855, wherein the deposition tool comprises an atomic layer deposition tool.

3857. The method of claim 3844, wherein the measurement device further comprises an eddy current device.

3858. The method of claim 3844, wherein the measurement device further comprises an eddy current device, and wherein the deposition tool comprises an atomic layer deposition tool.

3859. The method of claim 3844, wherein processing the one or more output signals to determine the characteristic of the layer comprises substantially simultaneously determining at least two characteristics of the layer.

3860. The method of claim 3844, further comprising controlling the illumination system to direct light toward multiple locations on the surface of the specimen substantially simultaneously and controlling the detection system to detect light propagating from the multiple locations substantially simultaneously such that the at least one characteristic of the layer on the specimen can be determined at the multiple locations substantially simultaneously.

3861. The method of claim 3844, wherein the measurement device is further coupled to a process chamber of the deposition tool.

3862. The method of claim 3844, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool.

3863. The method of claim 3844, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool, the method further comprising controlling a wafer handler coupled to the deposition tool to move the specimen to a stage coupled to the measurement device.

3864. The method of claim 3844, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool, the method further comprising controlling a stage coupled to the measurement device to move the specimen from the measurement device to the deposition tool.

3865. The method of claim 3844, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool, the method further comprising controlling a stage coupled to the measurement device to move the specimen to a process chamber of the deposition tool.

3866. The method of claim 3844, the method further comprising controlling a wafer handler to move the specimen to a stage coupled to the measurement device such that at least the one characteristic of the layer of the specimen can be determined while the specimen is waiting between process steps.

3867. The method of claim 3844, further comprising supporting the specimen during a deposition process step with a support device of the deposition tool, wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the measurement device.

3868. The method of claim 3844, further comprising supporting the specimen during a deposition process step with a support device of the deposition tool, wherein an upper

surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the measurement device.

3869. The method of claim 3844, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the deposition tool.

3870. The method of claim 3844, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the deposition tool.

3871. The method of claim 3844, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, the method further comprising controlling the stage to support the specimen during a deposition process step.

3872. The method of claim 3844, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, the method further comprising processing the one or more output signals to determine the characteristic of the specimen during a deposition process step.

3873. The method of claim 3844, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, the method further comprising controlling the measurement device to obtain a signature characterizing the formation of the layer, wherein the signature comprises at least one singularity representative of an end of the formation of the layer.

3874. The method of claim 3844, further comprising altering a parameter of one or more instruments coupled to the deposition tool in response to the determined characteristic using an in situ control technique.

3875. The method of claim 3844, wherein the deposition tool comprises a first process chamber and a second process chamber, the method further comprising controlling a stage coupled to the measurement device to move the specimen from the first process chamber to the second process chamber.

3876. The method of claim 3844, wherein the deposition tool comprises a first process chamber and a second process chamber, the method further comprising controlling a stage coupled to the measurement device to move the specimen from the first process chamber to the second process chamber, controlling the illumination system during said moving, and controlling the detection system during said moving.

3877. The method of claim 3844, further comprising comparing the determined characteristic of the layer and determined characteristics of a plurality of layers.

3878. The method of claim 3844, further comprising comparing the determined characteristic of the layer to a predetermined range for the characteristic.

3879. The method of claim 3844, further comprising comparing the determined characteristic of the layer to a predetermined range for the characteristic and generating an output signal if the determined characteristic is outside of the predetermined range for the characteristic.

3880. The method of claim 3844, further comprising altering a sampling frequency of the measurement device in response to the determined characteristic of the layer.

3881. The method of claim 3844, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined characteristic using a feedback control technique.

3882. The method of claim 3844, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined characteristic using a feedforward control technique.

3883. The method of claim 3844, further comprising generating a database, wherein the database comprises the determined characteristic of the layer.

3884. The method of claim 3844, further comprising generating a database comprising the determined characteristic of the layer and calibrating the measurement device using the database.

3885. The method of claim 3844, further comprising generating a database comprising the determined characteristic of the layer and monitoring output signals generated by the measurement device using the database.

3886. The method of claim 3844, further comprising generating a database comprising the determined characteristic of the layer and determined characteristics of a plurality of layers.

3887. The method of claim 3844, further comprising generating a database comprising the determined characteristic of the layer and determined characteristics of a plurality of layers, wherein the determined characteristics of the plurality of layers are generated using a plurality of measurement devices.

3888. The method of claim 3844, further comprising generating a database comprising the determined characteristic of the layer and determined characteristics of a plurality of layers, wherein the determined characteristics of the plurality of layers are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

3889. The method of claim 3844, further comprising generating a database comprising the determined characteristic of the layer and determined characteristics of a plurality of layers, wherein the determined characteristics of the plurality of layers are generated using a plurality of measurement devices, the method further comprising monitoring output signals generating by the plurality of measurement devices using the database.

3890. The method of claim 3844, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

3891. The method of claim 3844, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

3892. The method of claim 3844, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least

one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

3893. The method of claim 3844, further comprising altering a parameter of one or more instruments coupled to the deposition tool in response to the determined characteristic of the layer using a feedback control technique.

3894. The method of claim 3844, further comprising altering a parameter of one or more instruments coupled to the deposition tool in response to the determined characteristic of the layer using a feedforward control technique.

3895. The method of claim 3844, further comprising monitoring a parameter of one or more instruments coupled to the deposition tool.

3896. The method of claim 3844, further comprising monitoring a parameter of one or more instruments coupled to the deposition tool and determining a relationship between the determined characteristic and at least one of the monitored parameters.

3897. The method of claim 3844, further comprising monitoring a parameter of one or more instruments coupled to the deposition tool, determining a relationship between the determined characteristic and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

3898. The method of claim 3844, further comprising altering a parameter of one or more instruments coupled to a plurality of semiconductor fabrication process tools in response to the determined characteristic of the layer.

3899. The method of claim 3844, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

3900. The method of claim 3899, wherein at least partially processing the one or more output signals comprises determining the characteristic of the layer.

3901. The method of claim 3899, wherein further processing the partially processed one or more output signals comprises determining the characteristic of the layer.

3902. A semiconductor device fabricated by a method, the method comprising:

disposing the specimen in a deposition tool configured to form a layer of material on a specimen, wherein the deposition tool is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

forming a layer of material upon a specimen, wherein the formed layer comprises a portion of the semiconductor device;

directing light toward a surface of the specimen using the illumination system;

detecting light propagating from the surface of the specimen using the detection system, wherein the illumination system and the detection system comprise at least a spectroscopic reflectometer and a spectroscopic ellipsometer;

generating one or more output signals responsive to the detected light; and

processing the one or more output signals to determine a characteristic of the layer.

3903. The device of claim 3902, wherein optical elements of the spectroscopic reflectometer comprise optical elements of the spectroscopic ellipsometer.

3904. The device of claim 3902, wherein the characteristic is selected from the group comprising a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a presence of defects.

3905. The device of claim 3902, wherein the processor is further configured to determine one or more characteristics of the layer, and wherein the one or more characteristics are selected from the group comprising a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a presence of defects.

3906. The device of claim 3902, further comprising processing the one or more output signals to determine an additional characteristic of the specimen, wherein the additional characteristic is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

3907. The device of claim 3902, wherein the deposition tool comprises an atomic layer deposition tool.

3908. The device of claim 3902, wherein the illumination system and the detection system further comprise an eddy current device.

3909. The device of claim 3902, wherein the illumination system and the detection system further comprise an eddy current device, and wherein the deposition tool comprises an atomic layer deposition tool.

3910. The device of claim 3902, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two characteristics of the layer substantially simultaneously.

3911. The device of claim 3902, further comprising directing light toward multiple locations on the surface of the specimen substantially simultaneously and detecting light propagating from the multiple locations substantially simultaneously such that the at least one characteristic of the layer on the specimen can be determined at the multiple locations substantially simultaneously.

3912. The device of claim 3902, wherein the measurement device is further coupled to a process chamber of the deposition tool.

3913. The device of claim 3902, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool.

3914. The device of claim 3902, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, and wherein processing

the one or more output signals comprises determining the characteristic of the specimen during a deposition process.

3915. The device of claim 3902, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, the method further comprising obtaining a signature characterizing the formation of the layer, wherein the signature comprises at least one singularity representative of an end of the formation of the layer.

3916. The device of claim 3902, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, the method further comprising altering a parameter of one or more instruments coupled to the deposition tool in response to the determined characteristic using an in situ control technique.

3917. The device of claim 3902, wherein the deposition tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the measurement device, directing light during said moving, and detecting light during said moving.

3918. A method for fabricating a semiconductor device, comprising:

disposing the specimen in a deposition tool configured to form a layer of material on a specimen, wherein the deposition tool is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

forming a layer of material upon a specimen, wherein the formed layer comprises a portion of the semiconductor device;

directing light toward a surface of the specimen using the illumination system;

detecting light propagating from the surface of the specimen using the detection system, wherein the illumination system and the detection system comprise at least a spectroscopic reflectometer and a spectroscopic ellipsometer;

generating one or more output signals responsive to the detected light; and

processing the one or more output signals to determine a characteristic of the layer.

3919. The method of claim 3918, wherein optical elements of the spectroscopic reflectometer comprise optical elements of the spectroscopic ellipsometer.

3920. The method of claim 3918, wherein the characteristic is selected from the group comprising a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a presence of defects.

3921. The method of claim 3918, wherein the processor is further configured to determine one or more characteristics of the layer, and wherein the one or more characteristics are selected from the group comprising a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a presence of defects.

3922. The method of claim 3918, further comprising processing the one or more output signals to determine an additional characteristic of the specimen, wherein the additional

characteristic is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

3923. The method of claim 3922, wherein the deposition tool comprises an atomic layer deposition tool.

3924. The method of claim 3918, wherein the illumination system and the detection system further comprise an eddy current device.

3925. The method of claim 3918, wherein the illumination system and the detection system further comprise an eddy current device, and wherein the deposition tool comprises an atomic layer deposition tool.

3926. The method of claim 3918, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two characteristics of the layer substantially simultaneously.

3927. The method of claim 3918, further comprising directing light toward multiple locations on the surface of the specimen substantially simultaneously and detecting light propagating from the multiple locations substantially simultaneously such that the at least one characteristic of the layer on the specimen can be determined at the multiple locations substantially simultaneously.

3928. The method of claim 3918, wherein the measurement device is further coupled to a process chamber of the deposition tool.

3929. The method of claim 3918, wherein the measurement device is arranged laterally proximate to a process chamber of the deposition tool.

3930. The method of claim 3918, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, and wherein processing the one or more output signals comprises determining the characteristic of the specimen during a deposition process.

3931. The method of claim 3918, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, the method further comprising obtaining a signature characterizing the formation of the layer, wherein the signature comprises at least one singularity representative of an end of the formation of the layer.

3932. The method of claim 3918, wherein the measurement device is further coupled to a stage disposed within a process chamber of the deposition tool, the method further comprising altering a parameter of one or more instruments coupled to the deposition tool in response to the determined characteristic using an in situ control technique.

3933. The method of claim 3918, wherein the deposition tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the measurement device, directing light during said moving, and detecting light during said moving.

3934. A system configured to determine at least one characteristic of a layer on a specimen during use, comprising:

a deposition tool configured to form the layer of material on the specimen during use;

a measurement device coupled to the deposition tool, comprising:

an illumination system configured to direct light toward a surface of the specimen during use;

a detection system coupled to the illumination system and configured to detect light propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals in response to the detected energy; and

wherein the illumination system and the detection system are further configured such that the measurement device comprises at least a spectroscopic reflectometer and a spectroscopic ellipsometer;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine a characteristic of the layer from the one or more output signals during use.

3935. A method for determining at least one characteristic of a layer on a specimen, comprising:

forming the layer of material upon the specimen;

directing light toward a surface of the specimen using the illumination system;

detecting light propagating from the surface of the specimen using the detection system, wherein the illumination system and the detection system comprise at least a spectroscopic reflectometer and a spectroscopic ellipsometer;

generating one or more output signals responsive to the detected light; and

processing the one or more output signals to determine a characteristic of the layer, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

3936. A system configured to determine at least one property of a specimen during use, comprising:

an etch tool configured to etch the specimen during use;

a beam profile ellipsometer coupled to the etch tool, comprising:

an illumination system configured to direct an incident beam of light having a known polarization state to the specimen during use; and

a detection system coupled to the illumination system and configured to detect light returned from the specimen during use, wherein the beam profile ellipsometer is configured to generate one or more output signals responsive to the detected light during use; and

a processor coupled to the beam profile ellipsometer and configured to determine a property of the specimen from the one or more output signals during use.

3937. The system of claim 3936, further comprising a stage coupled to the beam profile ellipsometer, and wherein the stage is configured to move laterally during use.

3938. The system of claim 3936, further comprising a stage coupled to the beam profile ellipsometer, and wherein the stage is configured to move rotatably during use.

3939. The system of claim 3936, further comprising a stage coupled to the beam profile ellipsometer, and wherein the stage is configured to move laterally and rotatably during use.

3940. The system of claim 3936, further comprising an additional measurement device coupled to the etch tool, wherein the processor is further coupled to the additional measurement device, and wherein the processor is further configured to determine an additional property of the specimen from one or more output signals generated by the additional measurement device.

3941. The system of claim 3936, wherein the processor is further configured to determine an additional property of the specimen from the one or more output signals during use, and wherein the additional property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

3942. The system of claim 3936, further comprising an eddy current device coupled to the etch tool, wherein the processor is further coupled to the eddy current device, and wherein the processor is further configured to determine a thickness of the specimen from one or more output signals generated by the eddy current device.

3943. The system of claim 3936, wherein the property is selected from the group consisting of a thickness, an index of refraction, and an extinction coefficient.

3944. The system of claim 3936, wherein the processor is further configured to determine at least two properties of the specimen substantially simultaneously during use.

3945. The system of claim 3936, wherein the illumination system is further configured to direct the incident beam of light to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect light returned from the multiple locations on the surface of the specimen substantially simultaneously such that at least the one property of the specimen can be determined at the multiple locations substantially simultaneously.

3946. The system of claim 3936, wherein the beam profile ellipsometer is further coupled to a process chamber of the etch tool.

3947. The system of claim 3936, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool.

3948. The system of claim 3936, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool, and wherein the etch tool comprises a wafer handler configured to move the specimen to a stage coupled to the beam profile ellipsometer during use.

3949. The system of claim 3936, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool, and wherein a stage coupled to the beam profile ellipsometer is configured to move the specimen from the beam profile ellipsometer to the etch tool during use.

3950. The system of claim 3936, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool, and wherein a stage coupled to the beam profile ellipsometer is configured to move the specimen to the process chamber of the etch tool during use.

3951. The system of claim 3936, wherein the system is further configured to determine at least the one property of the specimen while the specimen is waiting between process steps.

3952. The system of claim 3936, wherein the etch tool comprises a support device configured to support the specimen during an etch process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the beam profile ellipsometer.

3953. The system of claim 3936, wherein the etch tool comprises a support device configured to support the specimen during an etch process step, and wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the beam profile ellipsometer.

3954. The system of claim 3936, wherein the beam profile ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the etch tool.

3955. The system of claim 3936, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the etch tool.

3956. The system of claim 3936, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, and wherein the stage is configured to support the specimen during an etch process step.

3957. The system of claim 3936, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, and wherein the processor is further configured to determine the characteristic of the specimen during an etch process step.

3958. The system of claim 3936, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, wherein the processor is further configured to obtain a signature characterizing etching of the specimen during use, and wherein the signature comprises at least one singularity representative of an end of the etching of the specimen.

3959. The system of claim 3936, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, wherein the processor is coupled to the etch tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the etch tool in response to the determined property using an in situ control technique during use.

3960. The system of claim 3936, wherein the etch tool comprises a first process chamber and a second process chamber, wherein a stage coupled to the beam profile ellipsometer is configured to move the specimen from the first process chamber to the second process chamber during use, and wherein the processor is further configured to determine the property of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

3961. The system of claim 3936, wherein the processor is further configured to compare the determined property of the specimen and properties of a plurality of specimens during use.

3962. The system of claim 3936, wherein the processor is further configured to compare the determined property of the specimen to a predetermined range for the property during use.

3963. The system of claim 3936, wherein the processor is further configured to compare the determined property of the specimen to a predetermined range for the property during use, and wherein the processor is further configured to generate an output signal if the determined property is outside of the predetermined range for the property during use.

3964. The system of claim 3936, wherein the processor is further configured to alter a sampling frequency of the beam profile ellipsometer in response to the determined property during use.

3965. The system of claim 3936, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the beam profile ellipsometer in response to the determined property using a feedback control technique during use.

3966. The system of claim 3936, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the beam profile ellipsometer in response to the determined property using a feedforward control technique during use.

3967. The system of claim 3936, wherein the processor is further configured to generate a database during use, and wherein the database comprises the determined property.

3968. The system of claim 3936, wherein the processor is further configured to generate a database during use, and wherein the processor is further configured to calibrate the beam profile ellipsometer using the database during use.

3969. The system of claim 3936, wherein the processor is further configured to generate a database during use, and wherein the processor is further configured to monitor output signals generated by beam profile ellipsometer using the database during use.

3970. The system of claim 3936, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined property and properties of a plurality of specimens, and wherein the properties of the plurality of specimens are determined using the beam profile ellipsometer.

3971. The system of claim 3936, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined property and properties of a plurality of specimens, and wherein the properties of the plurality of specimens are determined using a plurality of beam profile ellipsometers.

3972. The system of claim 3971, wherein the processor is further coupled to the plurality of beam profile ellipsometers, and wherein the processor is further configured to calibrate the plurality of beam profile ellipsometers using the database during use.

3973. The system of claim 3971, wherein the processor is further coupled to the plurality of beam profile ellipsometers, and wherein the processor is further configured to monitor output signals generated by the plurality of beam profile ellipsometers using the database during use.

3974. The system of claim 3936, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

3975. The system of claim 3936, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

3976. The system of claim 3936, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter

at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

3977. The system of claim 3936, wherein the processor is further coupled to the etch tool.

3978. The system of claim 3936, wherein the processor is further coupled to the etch tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the etch tool in response to the determined property using a feedback control technique during use.

3979. The system of claim 3936, wherein the processor is further coupled to the etch tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the etch tool in response to the determined property using a feedforward control technique during use.

3980. The system of claim 3936, wherein the processor is further coupled to the etch tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the etch tool during use.

3981. The system of claim 3936, wherein the processor is further coupled to the etch tool, wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the etch tool during use, and wherein the processor is further configured to determine a relationship between the determined property and at least one of the monitored parameters during use.

3982. The system of claim 3936, wherein the processor is further coupled to the etch tool, wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the etch tool during use, wherein the processor is further configured to determine a relationship between the determined property and at least one of the monitored parameters during use, and wherein the processor is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

3983. The system of claim 3936, wherein the processor is further coupled to a plurality of beam profile ellipsometers, and wherein at least one of the plurality of beam profile ellipsometers is coupled to an etch tool.

3984. The system of claim 3936, wherein the processor is further coupled to a plurality of etch tools, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the plurality of etch tools during use.

3985. The system of claim 3936, wherein the processor comprises a local processor coupled to the beam profile ellipsometer and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

3986. The system of claim 3985, wherein the local processor is further configured to determine the property during use.

3987. The system of claim 3985, wherein the remote controller computer is further configured to determine the property during use.

3988. A method for determining at least one property of a specimen, comprising:

etching the specimen in an etch tool;

directing an incident beam of light having a known polarization state to the specimen using an illumination system;

detecting light returned from the surface of the specimen using a detection system, wherein the illumination system and the detection system comprise a beam profile ellipsometer, and wherein the beam profile ellipsometer is coupled to the etch tool;

generating one or more output signals representative of the detected light; and

processing the one or more output signals to determine a property of the specimen.

3989. The method of claim 3988, wherein a stage is coupled to the beam profile ellipsometer, the method further comprising laterally moving the stage during said directing light and said detecting light.

3990. The method of claim 3988, wherein a stage is coupled to the beam profile ellipsometer, the method further comprising rotatably moving the stage during said directing light and said detecting light.

3991. The method of claim 3988, wherein a stage is coupled to the beam profile ellipsometer, the method further comprising laterally and rotatably moving the stage during said directing light and detecting light.

3992. The method of claim 3988, wherein an additional illumination system and an additional detection system comprise an additional measurement device coupled to the etch tool, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

3993. The method of claim 3988, further comprising processing the one or more output signals to determine an additional property of the specimen, wherein the additional property is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

3994. The method of claim 3988, wherein an eddy current device is coupled to the etch tool, the method further comprising processing one or more output signals generated by the eddy current device to determine a thickness of the specimen.

3995. The method of claim 3988, wherein the property is selected from the group comprising a thickness, an index of refraction, and an extinction coefficient.

3996. The method of claim 3988, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two properties of the specimen substantially simultaneously.

3997. The method of claim 3988, further comprising directing the incident beam of light toward multiple locations on the surface of the specimen substantially simultaneously and

detecting light returned from the multiple locations substantially simultaneously such that the at least one property of the specimen can be determined at the multiple locations substantially simultaneously.

3998. The method of claim 3988, wherein the beam profile ellipsometer is further coupled to a process chamber of the etch tool.

3999. The method of claim 3988, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool.

4000. The method of claim 3988, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool, the method further comprising moving the specimen to a stage coupled to the beam profile ellipsometer with a wafer handler of the etch tool.

4001. The method of claim 3988, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool, the method further comprising moving the specimen from the beam profile ellipsometer to the etch tool with a stage coupled to the beam profile ellipsometer.

4002. The method of claim 3988, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool, the method further comprising moving the specimen to the process chamber of the etch tool with a stage coupled to the beam profile ellipsometer.

4003. The method of claim 3988, further comprising determining at least the one property of the specimen while the specimen is waiting between process steps.

4004. The method of claim 3988, further comprising supporting the specimen during an etch process step with a support device of the etch tool, wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the beam profile ellipsometer.

4005. The method of claim 3988, further comprising supporting the specimen during an etch process step with a support device of the etch tool, wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the beam profile ellipsometer.

4006. The method of claim 3988, wherein the beam profile ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the etch tool.

4007. The method of claim 3988, wherein the beam profile ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the etch tool.

4008. The method of claim 3988, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, the method further comprising supporting the specimen during an etch process step with the stage.

4009. The method of claim 3988, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, and wherein processing the one or more output signals comprises determining the property of the specimen during an etch process.

4010. The method of claim 3988, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, the method further comprising obtaining a signature characterizing etching of the specimen, wherein the signature comprises at least one singularity representative of an end of the etching of the specimen.

4011. The method of claim 3988, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, the method further comprising altering a parameter of one or more instruments coupled to the etch tool in response to the determined property using an in situ control technique.

4012. The method of claim 3988, wherein the etch tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the beam profile ellipsometer.

4013. The method of claim 3988, wherein the etch tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the beam profile ellipsometer, directing light during said moving, and detecting light during said moving.

4014. The method of claim 3988, further comprising comparing the determined property and properties of a plurality of etched regions.

4015. The method of claim 3988, further comprising comparing the determined property to a predetermined range for the property.

4016. The method of claim 4015, further comprising generating an output signal if the determined property is outside of the predetermined range.

4017. The method of claim 3988, further comprising altering a sampling frequency of the beam profile ellipsometer in response to the determined property of the layer.

4018. The method of claim 3988, further comprising altering a parameter of one or more instruments coupled to the beam profile ellipsometer in response to the determined property using a feedback control technique.

4019. The method of claim 3988, further comprising altering a parameter of one or more instruments coupled to the beam profile ellipsometer in response to the determined property using a feedforward control technique.

4020. The method of claim 3988, further comprising generating a database, wherein the database comprises the determined property of the specimen.

4021. The method of claim 3988, further comprising generating a database comprising the determined property of the specimen and calibrating the beam profile ellipsometer using the database.

4022. The method of claim 3988, further comprising generating a database comprising the determined property of the specimen and monitoring output signals generated by the beam profile ellipsometer using the database.

4023. The method of claim 3988, further comprising generating a database comprising the determined property of the specimen and properties of a plurality of specimen.

4024. The method of claim 3988, further comprising generating a database comprising the determined property of the specimen and properties of a plurality of specimen, wherein the properties of the plurality of specimen are generated using a plurality of beam profile ellipsometers, the method further comprising calibrating the plurality of beam profile ellipsometers using the database.

4025. The method of claim 3988, further comprising generating a database comprising the determined property of the specimen and properties of a plurality of specimen, wherein the properties of the plurality of specimen are generated using a plurality of beam profile ellipsometers, the method further comprising monitoring the plurality of beam profile ellipsometers using the database.

4026. The method of claim 3988, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

4027. The method of claim 3988, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

4028. The method of claim 3988, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one

of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4029. The method of claim 3988, further comprising altering a parameter of one or more instruments coupled to the etch tool in response to the determined property using a feedback control technique.

4030. The method of claim 3988, further comprising altering a parameter of one or more instruments coupled to the etch tool in response to the determined property using a feedforward control technique.

4031. The method of claim 3988, further comprising monitoring a parameter of one or more instruments coupled to the etch tool.

4032. The method of claim 3988, further comprising monitoring a parameter of one or more instruments coupled to the etch tool and determining a relationship between the determined property and at least one of the monitored parameters.

4033. The method of claim 3988, further comprising monitoring a parameter of one or more instruments coupled to the etch tool, determining a relationship between the determined property and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

4034. The method of claim 3988, further comprising altering a parameter of one or more instruments coupled to at least one semiconductor fabrication process tool in response to the determined property of the layer.

4035. The method of claim 3988, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the beam profile ellipsometer;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

4036. The method of claim 4035, wherein at least partially processing the one or more output signals comprises determining the property.

4037. The method of claim 4035, wherein further processing the partially processed one or more output signals comprises determining the property.

4038. A computer-implemented method for controlling a system configured to determine at least one property of a specimen during use, wherein the system comprises a beam profile ellipsometer coupled to an etch tool, and wherein the etch tool is configured to etch the specimen during use, the method comprising:

controlling the beam profile ellipsometer, wherein the beam profile ellipsometer comprises an illumination system and a detection system, comprising:

controlling the illumination system to direct light toward a surface of the specimen;

controlling the detection system to detect light propagating from the surface of the specimen; and

generating one or more output signals representative of detected light; and

processing the one or more output signals to determine a property of the specimen.

4039. The method of claim 4038, wherein the system further comprises a stage coupled to the beam profile ellipsometer, the method further comprising supporting the specimen with the stage and controlling the stage to move laterally during said controlling the illumination system and said controlling the detection system.

4040. The method of claim 4038, wherein the system further comprises a stage coupled to the beam profile ellipsometer, the method further comprising supporting the specimen with the stage and controlling the stage to move rotatably during said controlling the illumination system and said controlling the detection system.

4041. The method of claim 4038, wherein the system further comprises a stage coupled to the beam profile ellipsometer, the method further comprising supporting the specimen with the stage and controlling the stage to move laterally and rotatably during said controlling the illumination system and said controlling the detection system.

4042. The method of claim 4038, wherein the system further comprises an additional measurement device coupled to the etch tool, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4043. The method of claim 4038, further comprising processing the one or more output signals to determine an additional property of the specimen, wherein the additional property is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

4044. The method of claim 4038, wherein the system further comprises an eddy current device coupled to the etch tool, the method further comprising processing one or more output signals generated by the eddy current device to determine a thickness of the specimen.

4045. The method of claim 4038, wherein the property is selected from the group consisting of a thickness, an index of refraction, and an extinction coefficient.

4046. The method of claim 4038, wherein processing the one or more output signals to determine the property of the specimen comprises substantially simultaneously determining at least two properties of the specimen.

4047. The method of claim 4038, further comprising controlling the illumination system to direct light toward multiple locations on the surface of the specimen substantially simultaneously and controlling the detection system to detect light propagating from the multiple locations substantially simultaneously such that the at least one property of the specimen can be determined at the multiple locations substantially simultaneously.

4048. The method of claim 4038, wherein the beam profile ellipsometer is further coupled to a process chamber of the etch tool.

4049. The method of claim 4038, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool.

4050. The method of claim 4038, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool, the method further comprising controlling a wafer handler coupled to the etch tool to move the specimen to a stage coupled to the beam profile ellipsometer.

4051. The method of claim 4038, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool, the method further comprising controlling a stage coupled to the beam profile ellipsometer to move the specimen from the beam profile ellipsometer to the etch tool.

4052. The method of claim 4038, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool, the method further comprising controlling a stage coupled to the beam profile ellipsometer to move the specimen to a process chamber of the etch tool.

4053. The method of claim 4038, the method further comprising controlling a wafer handler to move the specimen to a stage coupled to the beam profile ellipsometer such that at least the one property of the specimen can be determined while the specimen is waiting between process steps.

4054. The method of claim 4038, further comprising supporting the specimen during an etch process step with a support device of the etch tool, wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the beam profile ellipsometer.

4055. The method of claim 4038, further comprising supporting the specimen during an etch process step with a support device of the etch tool, wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the beam profile ellipsometer.

4056. The method of claim 4038, wherein the beam profile ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the etch tool.

4057. The method of claim 4038, wherein the beam profile ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the etch tool.

4058. The method of claim 4038, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, the method further comprising controlling the stage to support the specimen during an etch process step.

4059. The method of claim 4038, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, the method further comprising processing the one or more output signals to determine the characteristic of the specimen during an etch process step.

4060. The method of claim 4038, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, the method further comprising controlling the beam profile ellipsometer to obtain a signature characterizing etching of the specimen, wherein the signature comprises at least one singularity representative of an end of the etching of the specimen.

4061. The method of claim 4038, further comprising altering a parameter of one or more instruments coupled to the etch tool in response to the determined property using an in situ control technique.

4062. The method of claim 4038, wherein the etch tool comprises a first process chamber and a second process chamber, the method further comprising controlling a stage coupled to the beam profile ellipsometer to move the specimen from the first process chamber to the second process chamber.

4063. The method of claim 4038, wherein the etch tool comprises a first process chamber and a second process chamber, the method further comprising controlling a stage coupled to the measurement device to move the specimen from the first process chamber to the second process chamber, controlling the illumination system during said moving, and controlling the detection system during said moving.

4064. The method of claim 4038, further comprising comparing the determined property and properties of a plurality of specimens.

4065. The method of claim 4038, further comprising comparing the determined property to a predetermined range for the property.

4066. The method of claim 4038, further comprising generating an output signal if the determined property is outside of the predetermined range for the property.

4067. The method of claim 4038, further comprising altering a sampling frequency of the beam profile ellipsometer in response to the determined property.

4068. The method of claim 4038, further comprising altering a parameter of one or more instruments coupled to the beam profile ellipsometer in response to the determined property using a feedback control technique.

4069. The method of claim 4038, further comprising altering a parameter of one or more instruments coupled to the beam profile ellipsometer in response to the determined property using a feedforward control technique.

4070. The method of claim 4038, further comprising generating a database, wherein the database comprises the determined property.

4071. The method of claim 4038, further comprising generating a database, wherein the database comprises the determined property, and calibrating the beam profile ellipsometer using the database.

4072. The method of claim 4038, further comprising generating a database, wherein the database comprises the determined property, and monitoring output signals of the beam profile ellipsometer using the database.

4073. The method of claim 4038, further comprising generating a database, wherein the database comprises the determined property, and wherein the database further comprises properties of a plurality of specimens.

4074. The method of claim 4038, further comprising generating a database, wherein the database comprises the determined property, wherein the database further comprises properties of a plurality of specimens, and wherein the properties of the plurality of specimens are generated using a plurality of beam profile ellipsometers.

4075. The method of claim 4074, further comprising calibrating the plurality of beam profile ellipsometers using the database.

4076. The method of claim 4074, further comprising monitoring output signals of the plurality of beam profile ellipsometers using the database.

4077. The method of claim 4038, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

4078. The method of claim 4038, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

4079. The method of claim 4038, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4080. The method of claim 4038, further comprising altering a parameter of one or more instruments coupled to the etch tool in response to the determined property using a feedback control technique.

4081. The method of claim 4038, further comprising altering a parameter of one or more instruments coupled to the etch tool in response to the determined property using a feedforward control technique.

4082. The method of claim 4038, further comprising monitoring a parameter of one or more instruments coupled to the etch tool.

4083. The method of claim 4038, further comprising monitoring a parameter of one or more instruments coupled to the etch tool and determining a relationship between the determined property and at least one of the monitored parameters.

4084. The method of claim 4038, further comprising monitoring a parameter of one or more instruments coupled to the etch tool, determining a relationship between the determined property and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

4085. The method of claim 4038, further comprising altering a parameter of one or more instruments coupled to at least one of a plurality of semiconductor fabrication process tools in response to the determined property.

4086. The method of claim 4038, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the beam profile ellipsometer;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

4087. The method of claim 4086, wherein at least partially processing the one or more output signals comprises determining the property.

4088. The method of claim 4086, wherein further processing the partially processed one or more output signals comprises determining the property.

4089. A semiconductor device fabricated by a method, the method comprising:

etching a specimen using an etch tool;

directing an incident beam of light having a known polarization state to the specimen using an illumination system;

detecting light returned from the surface of the specimen using a detection system, wherein the illumination system and the detection system comprise a beam profile ellipsometer, and wherein the beam profile ellipsometer is coupled to the etch tool;

generating one or more output signals representative of the detected light; and

processing the one or more output signals to determine a property of the specimen.

4090. The device of claim 4089, wherein the property is selected from the group consisting of a thickness, an index of refraction, and an extinction coefficient.

4091. The device of claim 4089, wherein an additional illumination system and an additional detection system comprise an additional measurement device coupled to the etch tool, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4092. The device of claim 4089, further comprising processing the one or more output signals to determine an additional property of the specimen, wherein the additional property is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

4093. The device of claim 4089, wherein an eddy current device is coupled to the etch tool, the method further comprising processing one or more output signals generated by the eddy current device to determine a thickness of the specimen.

4094. The device of claim 4089, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two properties of the specimen substantially simultaneously.

4095. The device of claim 4089, further comprising directing the incident beam of light toward multiple locations on the surface of the specimen substantially simultaneously and detecting light returned from the multiple locations substantially simultaneously such that the at least one property of the specimen can be determined at the multiple locations substantially simultaneously.

4096. The device of claim 4089, wherein the beam profile ellipsometer is further coupled to a process chamber of the etch tool.

4097. The device of claim 4089, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool.

4098. The device of claim 4089, wherein the beam profile ellipsometer is arranged vertically proximate to a process chamber of the etch tool.

4099. The device of claim 4089, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, and wherein processing the one or more output signals comprises determining the property of the specimen during an etch process.

4100. The device of claim 4089, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, the method further comprising obtaining a signature characterizing etching of the specimen, wherein the signature comprises at least one singularity representative of an end of etching of the specimen.

4101. The device of claim 4089, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, the method further comprising altering a parameter of one or more instruments coupled to the etch tool in response to the determined property using an in situ control technique.

4102. The device of claim 4089, wherein the etch tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the

beam profile ellipsometer, directing light during said moving, and detecting light during said moving.

4103. A method for fabricating a semiconductor device, comprising:

etching a specimen using an etch tool;

directing an incident beam of light having a known polarization state to the specimen using an illumination system;

detecting light returned from the surface of the specimen using a detection system, wherein the illumination system and the detection system comprise a beam profile ellipsometer, and wherein the beam profile ellipsometer is coupled to the etch tool;

generating one or more output signals representative of the detected light; and

processing the one or more output signals to determine a property of the specimen.

4104. The method of claim 4103, wherein the property is selected from the group consisting of a thickness, an index of refraction, and an extinction coefficient.

4105. The method of claim 4103, wherein an additional illumination system and an additional detection system comprise an additional measurement device coupled to the etch tool, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4106. The method of claim 4103, further comprising processing the one or more output signals to determine an additional property of the specimen, wherein the additional property is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

4107. The method of claim 4103, wherein an eddy current device is coupled to the etch tool, the method further comprising processing one or more output signals generated by the eddy current device to determine a thickness of the specimen.

4108. The method of claim 4103, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two properties of the specimen substantially simultaneously.

4109. The method of claim 4103, further comprising directing the incident beam of light toward multiple locations on the surface of the specimen substantially simultaneously and detecting light returned from the multiple locations substantially simultaneously such that the at least one property of the specimen can be determined at the multiple locations substantially simultaneously.

4110. The method of claim 4103, wherein the beam profile ellipsometer is further coupled to a process chamber of the etch tool.

4111. The method of claim 4103, wherein the beam profile ellipsometer is arranged laterally proximate to a process chamber of the etch tool.

4112. The method of claim 4103, wherein the beam profile ellipsometer is arranged vertically proximate to a process chamber of the etch tool.

4113. The method of claim 4103, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, and wherein processing the one or more output signals comprises determining the property of the specimen during an etch process.

4114. The method of claim 4103, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, the method further comprising obtaining a signature characterizing etching of the specimen, wherein the signature comprises at least one singularity representative of an end of etching of the specimen.

4115. The method of claim 4103, wherein the beam profile ellipsometer is further coupled to a stage disposed within a process chamber of the etch tool, the method further comprising altering a parameter of one or more instruments coupled to the etch tool in response to the determined property using an in situ control technique.

4116. The method of claim 4103, wherein the etch tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the beam profile ellipsometer, directing light during said moving, and detecting light during said moving.

4117. A system configured to determine at least one property of a specimen during use, comprising:

an etch tool configured to etch the specimen during use;

a beam profile ellipsometer coupled to the etch tool, comprising:

an illumination system configured to direct an incident beam of light having a known polarization state to the specimen during use; and

a detection system coupled to the illumination system and configured to detect light returned from the specimen during use, wherein the beam profile ellipsometer is configured to generate one or more output signals responsive to the detected light during use;

a local processor coupled to the beam profile ellipsometer and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to further process the one or more output signals to determine a property of the specimen during use.

4118. A method for determining at least one property of a specimen, comprising:

etching the specimen using an etch tool;

directing an incident beam of light having a known polarization state to the specimen using an illumination system;

detecting light returned from the surface of the specimen using a detection system, wherein the illumination system and the detection system comprise a beam profile

ellipsometer, and wherein the beam profile ellipsometer is coupled to the etch tool;

generating one or more output signals responsive to the detected light; and

processing the one or more output signals to determine a property of the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the beam profile ellipsometer;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

4119. A system configured to a characteristic of a specimen during use, comprising:

an ion implanter configured to direct ions toward the specimen during use;

a measurement device coupled to the ion implanter, wherein the measurement device is configured:

to periodically direct an incident beam of light to a region of the specimen to periodically excite the region of the specimen during use;

to direct a sample beam of light to the periodically excited region of the specimen during use;

to measure an intensity of the sample beam reflected from the periodically excited region of the specimen during use; and

to generate one or more output signals responsive to the measured intensity of the reflected sample beam; and

a processor coupled to the measurement device and configured to determine a characteristic of the region of the specimen from the one or more output signals during use.

4120. The system of claim 4119, further comprising a stage coupled to the measurement device, wherein the stage is configured to move laterally during use.

4121. The system of claim 4119, further comprising a stage coupled to the measurement device, wherein the stage is configured to move rotatably during use.

4122. The system of claim 4119, further comprising a stage coupled to the measurement device, wherein the stage is configured to move laterally and rotatably during use.

4123. The system of claim 4119, further comprising an additional measurement device coupled to the ion implanter, wherein the processor is further configured to determine an additional property of the specimen from one or more output signals generated by the additional measurement device.

4124. The system of claim 4119, wherein the characteristic is selected from the group consisting of a presence of ions in the region, a concentration of ions in the region, a depth of the region, and a distribution profile of the region.

4125. The system of claim 4119, wherein the processor is further configured to determine at least two characteristics of the implanted region substantially simultaneously during use.

4126. The system of claim 4119, wherein the measurement device is further configured to periodically direct the incident beam of light to multiple regions of the specimen substantially simultaneously during use, to direct the sample beam of light to the multiple periodically excited regions of the specimen substantially simultaneously during use, and to measure the intensity of the sample beam reflected from the multiple periodically excited regions of the specimen substantially simultaneously during use such that the characteristic of multiple regions of the specimen can be determined substantially simultaneously.

4127. The system of claim 4119, wherein the measurement device is further coupled to a process chamber of the ion implanter.

4128. The system of claim 4119, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter.

4129. The system of claim 4119, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter, and wherein the ion implanter comprises a wafer handler configured to move the specimen to a stage coupled to the measurement device during use.

4130. The system of claim 4119, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter, and wherein a stage coupled to the measurement device is configured to move the specimen from the measurement device to the ion implanter during use.

4131. The system of claim 4119, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter, and wherein a stage coupled to the measurement device is configured to move the specimen to the process chamber of the ion implanter during use.

4132. The system of claim 4119, wherein the system is further configured to determine the characteristic of the specimen while the specimen is waiting between process steps.

4133. The system of claim 4119, wherein the ion implanter comprises a support device configured to support the specimen during an ion implantation process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the measurement device.

4134. The system of claim 4119, wherein the ion implanter comprises a support device configured to support the specimen during an ion implantation process step, and wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the measurement device.

4135. The system of claim 4119, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the etch tool.

4136. The system of claim 4119, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the etch tool.

4137. The system of claim 4119, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, and wherein the stage is configured to support the specimen during and ion implantation process step.

4138. The system of claim 4119, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, and wherein the processor is further configured to determine the characteristic of the region during an ion implantation process step.

4139. The system of claim 4119, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, and wherein the processor is further configured to obtain a signature characterizing the implantation of ions during use, and wherein the signature comprises at least one singularity representative of an end of the implantation of ions.

4140. The system of claim 4119, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, wherein the processor is coupled to the ion implanter, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the ion implanter in response to the determined characteristic using an in situ control technique during use.

4141. The system of claim 4119, wherein the ion implanter comprises a first process chamber and a second process chamber, and wherein a stage coupled to the measurement

device is configured to move the specimen from the first process chamber to the second process chamber during use.

4142. The system of claim 4119, wherein the ion implanter comprises a first process chamber and a second process chamber, wherein a stage coupled to the measurement device is configured to move the specimen from the first process chamber to the second process chamber during use, and wherein the processor is further configured to determine the property of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

4143. The system of claim 4119, wherein the processor is further configured to compare the determined characteristic of the region and characteristics of a plurality of regions during use.

4144. The system of claim 4119, wherein the processor is further configured to compare the determined characteristic of the region to a predetermined range for the characteristic during use.

4145. The system of claim 4144, wherein the processor is further configured to generate an output signal if the determined characteristic of the region is outside of the predetermined range for the characteristic during use.

4146. The system of claim 4119, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to the determined characteristic of the region during use.

4147. The system of claim 4119, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined characteristic using a feedback control technique during use.

4148. The system of claim 4119, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined characteristic using a feedforward control technique during use.

4149. The system of claim 4119, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined characteristic of the region.

4150. The system of claim 4119, wherein the processor is further configured to generate a database during use, and wherein the processor is further configured to calibrate the measurement device using the database during use.

4151. The system of claim 4119, wherein the processor is further configured to generate a database during use, and wherein the processor is further configured to monitor output signals generated by measurement device using the database during use.

4152. The system of claim 4119, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined characteristic of the region and characteristics of a plurality of regions, and wherein the characteristics of the plurality of regions are determined using the measurement device.

4153. The system of claim 4119, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined characteristic of

the region and characteristics of a plurality of regions, and wherein the characteristics of the plurality of regions are determined using a plurality of measurement devices.

4154. The system of claim 4153, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

4155. The system of claim 4153, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

4156. The system of claim 4119, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

4157. The system of claim 4119, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

4158. The system of claim 4119, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to

at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4159. The system of claim 4119, wherein the processor is further coupled to the ion implanter.

4160. The system of claim 4119, wherein the processor is further coupled to the ion implanter, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the ion implanter in response to the determined characteristic using a feedback control technique during use.

4161. The system of claim 4119, wherein the processor is further coupled to the ion implanter, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the ion implanter in response to the determined characteristic using a feedforward control technique during use.

4162. The system of claim 4119, wherein the processor is further coupled to the ion implanter, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the ion implanter during use.

4163. The system of claim 4119, wherein the processor is further coupled to the ion implanter, wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the ion implanter during use, and wherein the processor is further configured to determine a relationship between the determined characteristic and at least one of the monitored parameters during use.

4164. The system of claim 4119, wherein the processor is further coupled to the ion implanter, wherein the processor is further configured to monitor a parameter of one or more

more instruments coupled to the ion implanter during use, wherein the processor is further configured to determine a relationship between the determined characteristic and at least one of the monitored parameters during use, and wherein the processor is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

4165. The system of claim 4119, wherein the processor is further coupled to a plurality of measurement devices, and wherein at least one of the plurality of measurement devices is coupled to an ion implanter.

4166. The system of claim 4119, wherein the processor is further coupled to a plurality of ion implanters, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the plurality of ion implanters during use.

4167. The system of claim 4119, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

4168. The system of claim 4167, wherein the local processor is further configured to determine the characteristic of the region during use.

4169. The system of claim 4167, wherein the remote controller computer is further configured to determine the characteristic of the region during use.

4170. A method for determining a characteristic of a specimen, comprising:

implanting ions into the specimen using an ion implanter;

periodically directing an incident beam of light to a region of the specimen to periodically excite the region of the specimen using an illumination system of a measurement device, wherein the measurement device is coupled to the ion implanter;

directing a sample beam of light to the periodically excited region of the specimen using the illumination system;

measuring an intensity of the sample beam reflected from the periodically excited region of the specimen using a detection system of the measurement device;

generating one or more output signals responsive to the measured intensity of the reflected sample beam; and

processing the one or more output signals to determine a characteristic of the region of the specimen.

4171. The method of claim 4170, wherein a stage is coupled to the measurement device, the method further comprising laterally moving the stage during said periodically directing, said directing, and said measuring.

4172. The method of claim 4170, wherein a stage is coupled to the measurement device, the method further comprising rotatably moving the stage during said periodically directing, said directing, and said measuring.

4173. The method of claim 4170, wherein a stage is coupled to the measurement device, the method further comprising laterally and rotatably moving the stage during said periodically directing, said directing, and said measuring.

4174. The method of claim 4170, wherein an additional illumination system and an additional detection system comprise an additional measurement device coupled to the ion implanter, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4175. The method of claim 4170, wherein the characteristic is selected from the group comprising a presence of ions in the region, a depth of the region, a concentration of ions in the region, and a distribution profile of the region.

4176. The method of claim 4170, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two characteristics of the region substantially simultaneously.

4177. The method of claim 4170, further comprising periodically directing the incident beam of light toward multiple regions of the specimen substantially simultaneously, directing the sample beam of light to the multiple periodically excited regions of the specimen substantially simultaneously, and measuring the intensity of the sample beam reflected from the multiple periodically excited regions of the specimen substantially simultaneously such that the characteristic of the multiple regions of the specimen can be determined substantially simultaneously.

4178. The method of claim 4170, wherein the measurement device is further coupled to a process chamber of the ion implanter.

4179. The method of claim 4170, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter.

4180. The method of claim 4170, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter, the method further comprising moving the specimen to a stage coupled to the measurement device with a wafer handler of the ion implanter.

4181. The method of claim 4170, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter, the method further comprising moving the specimen from the measurement device to the ion implanter with a stage coupled to the measurement device.

4182. The method of claim 4170, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter, the method further comprising moving the specimen to the process chamber of the ion implanter with a stage coupled to the measurement device.

4183. The method of claim 4170, further comprising determining the characteristic of the specimen while the specimen is waiting between process steps.

4184. The method of claim 4170, further comprising supporting the specimen during an ion implantation process step with a support device of the ion implanter, wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the measurement device.

4185. The method of claim 4170, further comprising supporting the specimen during an ion implantation process step with a support device of the ion implanter, wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the measurement device.

4186. The method of claim 4170, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the ion implanter.

4187. The method of claim 4170, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the ion implanter.

4188. The method of claim 4170, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, the method further comprising supporting the specimen during an ion implantation process step with the stage.

4189. The method of claim 4170, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, and wherein processing the one or more output signals comprises determining the property of the specimen during an ion implantation process.

4190. The method of claim 4170, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, the method further comprising obtaining a signature characterizing the implantation of ions into the specimen, wherein the signature comprises at least one singularity representative of an end of the implantation of ions.

4191. The method of claim 4170, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, the method further comprising altering a parameter of one or more instruments coupled to the ion implanter in response to the determined characteristic using an in situ control technique.

4192. The method of claim 4170, wherein the ion implanter comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the measurement device.

4193. The method of claim 4170, wherein the ion implanter comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the measurement device during said periodically directing, said directing, and said measuring.

4194. The method of claim 4170, further comprising comparing the determined characteristic and characteristics of a plurality of regions.

4195. The method of claim 4170, further comprising comparing the determined characteristic to a predetermined range for the characteristic.

4196. The method of claim 4195, further comprising generating an output signal if the determined characteristic is outside of the predetermined range.

4197. The method of claim 4170, further comprising altering a sampling frequency of the measurement device in response to the determined characteristic of the region.

4198. The method of claim 4170, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined characteristic using a feedback control technique.

4199. The method of claim 4170, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined characteristic using a feedforward control technique.

4200. The method of claim 4170, further comprising generating a database, wherein the database comprises the determined characteristic of the region.

4201. The method of claim 4170, further comprising generating a database, wherein the database comprises the determined characteristic of the region, the method further comprising calibrating the measurement device using the database.

4202. The method of claim 4170, further comprising generating a database, wherein the database comprises the determined characteristic of the region, the method further comprising monitoring output signals of the measurement device using the database.

4203. The method of claim 4170, further comprising generating a database, wherein the database comprises the determined characteristic of the region and characteristics of a plurality of regions.

4204. The method of claim 4170, further comprising generating a database, wherein the database comprises the determined characteristic of the region and characteristics of a plurality of regions, wherein the characteristics of the plurality of regions are generated

using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

4205. The method of claim 4170, further comprising generating a database, wherein the database comprises the determined characteristic of the region and characteristics of a plurality of regions, wherein the characteristics of the plurality of regions are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

4206. The method of claim 4170, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

4207. The method of claim 4170, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

4208. The method of claim 4170, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4209. The method of claim 4170, further comprising altering a parameter of one or more instruments coupled to the ion implanter in response to the determined characteristic using a feedback control technique.

4210. The method of claim 4170, further comprising altering a parameter of one or more instruments coupled to the ion implanter in response to the determined characteristic using a feedforward control technique.

4211. The method of claim 4170, further comprising monitoring a parameter of one or more instruments coupled to the ion implanter.

4212. The method of claim 4170, further comprising monitoring a parameter of one or more instruments coupled to the ion implanter and determining a relationship between the determined characteristic and at least one of the monitored parameters.

4213. The method of claim 4170, further comprising monitoring a parameter of one or more instruments coupled to the ion implanter, determining a relationship between the determined characteristic and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

4214. The method of claim 4170, further comprising altering a parameter of one or more instruments coupled to at least one semiconductor fabrication process tool in response to the determined characteristic of the region.

4215. The method of claim 4170, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

4216. The method of claim 4215, wherein at least partially processing the one or more output signals comprises determining the characteristic of the region.

4217. The method of claim 4215, wherein further processing the partially processed one or more output signals comprises determining the characteristic of the region.

4218. A computer-implemented method for controlling a system configured to determine a characteristic of a specimen during use, wherein the system comprises a measurement device coupled to an ion implanter, and wherein the ion implanter is configured to direct ions toward the specimen during use, the method comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, comprising:

controlling the illumination system to periodically direct an incident beam of light to a region of the specimen to periodically excite the region of the specimen;

controlling the illumination system to direct a sample beam of light to the periodically excited region of the specimen;

controlling the detection system to measure an intensity of the sample beam reflected from the periodically excited region of the specimen; and

generating one or more output signals responsive to the measured intensity; and

processing the one or more output signals to determine a characteristic of the region of the specimen.

4219. The method of claim 4218, wherein the system further comprises a stage coupled to the measurement device, the method further comprising supporting the specimen with the stage and controlling the stage to move laterally during said controlling the measurement device.

4220. The method of claim 4218, wherein the system further comprises a stage coupled to the measurement device, the method further comprising supporting the specimen with the stage and controlling the stage to move rotatably during said controlling the measurement device.

4221. The method of claim 4218, wherein the system further comprises a stage coupled to the measurement device, the method further comprising supporting the specimen with the stage and controlling the stage to move laterally and rotatably during said controlling the measurement device.

4222. The method of claim 4218, wherein the system further comprises an additional measurement device coupled to the ion implanter, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4223. The method of claim 4218, wherein the characteristic is selected from the group consisting of a presence of ions in the region, a depth of the region, a concentration of ions in the region, and a distribution profile of the region.

4224. The method of claim 4218, wherein processing the one or more output signals to determine the characteristic of the region comprises substantially simultaneously determining at least two characteristics of the region.

4225. The method of claim 4218, further comprising controlling the illumination system to periodically direct the incident beam of light to multiple regions of the specimen substantially simultaneously, controlling the illumination system to direct the sample beam of light to the multiple periodically excited regions of the specimen, and controlling the detection system to measure the intensity of the sample beam reflected from the multiple periodically excited regions of the specimen substantially simultaneously such that the characteristic of the multiple regions of the specimen can be determined substantially simultaneously.

4226. The method of claim 4218, wherein the measurement device is further coupled to a process chamber of the ion implanter.

4227. The method of claim 4218, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter.

4228. The method of claim 4218, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter, the method further comprising controlling a wafer handler coupled to the ion implanter to move the specimen to a stage coupled to the measurement device.

4229. The method of claim 4218, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter, the method further comprising controlling a stage coupled to the measurement device to move the specimen from the measurement device to the ion implanter.

4230. The method of claim 4218, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter, the method further comprising controlling a stage coupled to the measurement device to move the specimen to a process chamber of the ion implanter.

4231. The method of claim 4218, the method further comprising controlling a wafer handler to move the specimen to a stage coupled to the measurement device such that at least the one characteristic of the layer of the specimen can be determined while the specimen is waiting between process steps.

4232. The method of claim 4218, further comprising supporting the specimen during an ion implantation process step with a support device of the ion implanter, wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the measurement device.

4233. The method of claim 4218, further comprising supporting the specimen during an ion implantation process step with a support device of the ion implanter, wherein an

upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the measurement device.

4234. The method of claim 4218, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the ion implanter.

4235. The method of claim 4218, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the ion implanter.

4236. The method of claim 4218, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, the method further comprising controlling the stage to support the specimen during an ion implantation process step.

4237. The method of claim 4218, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, the method further comprising processing the one or more output signals to determine the characteristic of the region during an ion implantation process step.

4238. The method of claim 4218, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, the method further comprising controlling the measurement device to obtain a signature characterizing the implantation of ions, wherein the signature comprises at least one singularity representative of an end of the implantation of ions.

4239. The method of claim 4218, further comprising altering a parameter of one or more instruments coupled to the ion implanter in response to the determined characteristic using an in situ control technique.

4240. The method of claim 4218, wherein the ion implanter comprises a first process chamber and a second process chamber, the method further comprising controlling a stage coupled to the measurement device to move the specimen from the first process chamber to the second process chamber.

4241. The method of claim 4218, wherein the ion implanter comprises a first process chamber and a second process chamber, the method further comprising controlling a stage coupled to the measurement device to move the specimen from the first process chamber to the second process chamber and controlling the measurement device during said moving.

4242. The method of claim 4218, further comprising comparing the determined characteristic of the region and characteristics of a plurality of regions.

4243. The method of claim 4218, further comprising comparing the determined characteristic of the region to a predetermined range for the characteristic.

4244. The method of claim 4243, further comprising generating an output signal if the determined characteristic is outside of the predetermined range for the characteristic.

4245. The method of claim 4218, further comprising altering a sampling frequency of the measurement device in response to the determined characteristic of the region.

4246. The method of claim 4218, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined characteristic using a feedback control technique.

4247. The method of claim 4218, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined characteristic using a feedforward control technique.

4248. The method of claim 4218, further comprising generating a database, wherein the database comprises the determined characteristic of the region.

4249. The method of claim 4218, further comprising generating a database, wherein the database comprises the determined characteristic of the region, and calibrating the measurement device using the database.

4250. The method of claim 4218, further comprising generating a database, wherein the database comprises the determined characteristic of the region, and monitoring output signals of the measurement device using the database.

4251. The method of claim 4218, further comprising generating a database, wherein the database comprises the determined characteristic of the region, and wherein the database further comprises characteristics of a plurality of regions.

4252. The method of claim 4218, further comprising generating a database, wherein the database comprises the determined characteristic of the region, wherein the database further comprises characteristics of a plurality of regions, and wherein the determined characteristics of the plurality of regions are generated using a plurality of measurement devices.

4253. The method of claim 4252, further comprising calibrating the plurality of measurement devices using the database.

4254. The method of claim 4252, further comprising monitoring output signals of the plurality of measurement devices using the database.

4255. The method of claim 4218, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

4256. The method of claim 4218, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

4257. The method of claim 4218, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4258. The method of claim 4218, further comprising altering a parameter of one or more instruments coupled to an ion implanter in response to the determined characteristic of the region using a feedback control technique.

4259. The method of claim 4218, further comprising altering a parameter of one or more instruments coupled to an ion implanter in response to the determined characteristic of the region using a feedforward control technique.

4260. The method of claim 4218, further comprising monitoring a parameter of one or more instruments coupled to the ion implanter.

4261. The method of claim 4218, further comprising monitoring a parameter of one or more instruments coupled to the ion implanter and determining a relationship between the determined characteristic and at least one of the monitored parameters.

4262. The method of claim 4218, further comprising monitoring a parameter of one or more instruments coupled to the ion implanter, determining a relationship between the determined characteristic and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

4263. The method of claim 4218, further comprising altering a parameter of one or more instruments coupled to at least one of a plurality of semiconductor fabrication process tools in response to the determined characteristic of the region.

4264. The method of claim 4218, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

4265. The method of claim 4264, wherein at least partially processing the one or more output signals comprises determining the characteristic.

4266. The method of claim 4264, wherein further processing the partially processes output signal comprises determining the characteristic.

4267. A semiconductor device fabricated by a method, the method comprising:

implanting ions into a specimen using an ion implanter, wherein the specimen comprises at least a portion of the semiconductor device;

periodically directing an incident beam of light to a region of the specimen to periodically excite the region of the specimen using an illumination system of a measurement device, wherein the measurement device is coupled to the ion implanter;

directing a sample beam of light to the periodically excited region of the specimen using the illumination system;

measuring an intensity of the sample beam reflected from the periodically excited region of the specimen using a detection system of the measurement device;

generating one or more output signals responsive to the measured intensity of the reflected sample beam; and

processing the one or more output signals to determine a characteristic of the region of the specimen.

4268. The device of claim 4267, wherein the characteristic is selected from the group consisting of a presence of ions in the region, a depth of the region, a concentration of ions in the region, and a distribution profile of the region.

4269. The device of claim 4267, wherein an additional illumination system and an additional detection system comprise an additional measurement device coupled to the ion implanter, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4270. The device of claim 4267, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two properties of the specimen substantially simultaneously.

4271. The device of claim 4267, further comprising periodically directing the incident beam of light toward multiple regions of the specimen substantially simultaneously, directing the sample beam of light to the multiple periodically excited regions of the specimen substantially simultaneously, and measuring the intensity of the sample beam reflected from the multiple periodically excited regions of the specimen substantially simultaneously such that the characteristic of the multiple regions of the specimen can be determined substantially simultaneously.

4272. The device of claim 4267, wherein the measurement device is further coupled to a process chamber of the ion implanter.

4273. The device of claim 4267, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter.

4274. The device of claim 4267, wherein the measurement device is arranged vertically proximate to a process chamber of the ion implanter.

4275. The device of claim 4267, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, and wherein processing the one or more output signals comprises determining the property of the specimen during an ion implantation process.

4276. The device of claim 4267, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, the method further comprising obtaining a signature characterizing ion implantation of the specimen, wherein the signature comprises at least one singularity representative of an end of the ion implantation of the specimen.

4277. The device of claim 4267, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, the method further comprising altering a parameter of one or more instruments coupled to the ion implanter in response to the determined property using an in situ control technique.

4278. The device of claim 4267, wherein the etch tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the

measurement device and periodically directing, directing, and measuring the intensity during said moving.

4279. A method for fabricating a semiconductor device, comprising:

implanting ions into a specimen using an ion implanter, wherein the specimen comprises at least a portion of the semiconductor device;

periodically directing an incident beam of light to a region of the specimen to periodically excite the region of the specimen using an illumination system of a measurement device, wherein the measurement device is coupled to the ion implanter;

directing a sample beam of light to the periodically excited region of the specimen using the illumination system;

measuring an intensity of the sample beam reflected from the periodically excited region of the specimen using a detection system of the measurement device;

generating one or more output signals responsive to the measured intensity of the reflected sample beam; and

processing the one or more output signals to determine a characteristic of the region of the specimen.

4280. The method of claim 4279, wherein the characteristic is selected from the group consisting of a presence of ions in the region, a depth of the region, a concentration of ions in the region, and a distribution profile of the region.

4281. The method of claim 4279, wherein an additional illumination system and an additional detection system comprise an additional measurement device coupled to the ion implanter, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4282. The method of claim 4279, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two properties of the specimen substantially simultaneously.

4283. The method of claim 4279, further comprising periodically directing the incident beam of light toward multiple regions of the specimen substantially simultaneously, directing the sample beam of light to the multiple periodically excited regions of the specimen substantially simultaneously, and measuring the intensity of the sample beam reflected from the multiple periodically excited regions of the specimen substantially simultaneously such that the characteristic of the multiple regions of the specimen can be determined substantially simultaneously.

4284. The method of claim 4279, wherein the measurement device is further coupled to a process chamber of the ion implanter.

4285. The method of claim 4279, wherein the measurement device is arranged laterally proximate to a process chamber of the ion implanter.

4286. The method of claim 4279, wherein the measurement device is arranged vertically proximate to a process chamber of the ion implanter.

4287. The method of claim 4279, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, and wherein processing the one or more output signals comprises determining the property of the specimen during an ion implantation process.

4288. The method of claim 4279, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, the method further comprising obtaining a signature characterizing ion implantation of the specimen, wherein the signature comprises at least one singularity representative of an end of the ion implantation of the specimen.

4289. The method of claim 4279, wherein the measurement device is further coupled to a stage disposed within a process chamber of the ion implanter, the method further comprising altering a parameter of one or more instruments coupled to the ion implanter in response to the determined property using an in situ control technique.

4290. The method of claim 4279, wherein the etch tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the measurement device and periodically directing, directing, and measuring the intensity during said moving.

4291. A system configured to determine a characteristic of a specimen during use, comprising:

an ion implanter configured to direct ions toward the specimen during use;

a measurement device coupled to the ion implanter, wherein the measurement

device is configured:

to periodically direct an incident beam of light to a region of the specimen to periodically excite the region of the specimen during use;

to direct a sample beam of light to the periodically excited region of the specimen during use;

to measure an intensity of the sample beam reflected from the periodically excited region of the specimen during use; and

to generate one or more output signals responsive to the measured intensity of the reflected sample beam during use;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to further process the at least partially processed one or more output signals to determine a characteristic of the region of the specimen.

4292. A method for determining a characteristic of a specimen, comprising:

implanting ions into a specimen using an ion implanter;

periodically directing an incident beam of light to a region of the specimen to periodically excite the region of the specimen using an illumination system of a

measurement device, wherein the measurement device is coupled to the ion implanter;

directing a sample beam of light to the periodically excited region of the specimen using the illumination system;

measuring an intensity of the sample beam reflected from the periodically excited region of the specimen using a detection system of the measurement device;

generating one or more output signals responsive to the measured intensity of the reflected sample beam; and

processing the one or more output signals to determine a characteristic of the region of the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

4293. A system configured to determine at least one characteristic of micro defects on a surface of a specimen during use, comprising:

a process tool configured to process the specimen during use;

a stage configured to support the specimen during use, wherein the stage is further configured to rotate during use;

a measurement device coupled to the process tool, wherein the measurement device is further coupled to the stage, comprising:

an illumination system configured to direct light toward the surface of the specimen during the process and during rotation of the stage; and

a detection system coupled to the illumination system and configured to detect light propagating from the surface of the specimen during the process and during rotation of the stage, wherein the measurement device is configured to generate one or more output signals in response to the detected light during use; and

a processor coupled to the measurement device and configured to determine at least the one characteristic of micro defects on the surface of the specimen from the one or more output signals during use.

4294. The system of claim 4293, wherein the stage is further configured to move laterally during use.

4295. The system of claim 4293, further comprising an additional measurement device coupled to the process tool, wherein the processor is further configured to determine an additional property of the specimen from one or more output signals generated by the additional measurement device.

4296. The system of claim 4293, wherein the detected light comprises dark field light propagating along a dark field path from the surface of the specimen.

4297. The system of claim 4293, wherein the detected light comprises bright field light propagating along a bright field path from the surface of the specimen.

4298. The system of claim 4293, wherein the detected light comprises dark field light propagating along a dark field path from the surface of the specimen and bright field light propagating along a bright field path from the surface of the specimen.

4299. The system of claim 4293, wherein the detected light comprises dark field light propagating along multiple dark field paths from the surface of the specimen.

4300. The system of claim 4293, wherein the detected light comprises dark field light propagating along multiple dark field paths from the surface of the specimen and bright field light propagating along a bright field path from the surface of the specimen.

4301. The system of claim 4293, wherein the specimen comprises a plurality of dies having repeatable pattern features, and wherein the processor is further configured to compare output signals responsive to detected light from at least two of the plurality of dies to determine at least the one characteristic of micro defects on the surface of the specimen.

4302. The system of claim 4293, wherein at least the one characteristic of micro defects is selected from the group consisting of a presence, a location, a number, and a type of micro defects on the surface of the specimen.

4303. The system of claim 4293, wherein the processor is further configured to determine at least two characteristics of micro defects on the surface of the specimen substantially simultaneously during use.

4304. The system of claim 4293, wherein the illumination system is further configured to direct light toward multiple locations on the surface of the specimen substantially simultaneously during the process and during rotation of the stage, and wherein the detection system is further configured to detect light propagating from the multiple locations on the surface of the specimen substantially simultaneously during the process and during rotation of the stage such that at least one characteristic of micro defects on the surface of the specimen at the multiple locations can be determined substantially simultaneously.

4305. The system of claim 4293, wherein the processor is further configured to determine an additional characteristic of the specimen from the one or more output signals during use, and wherein the additional characteristic is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

4306. The system of claim 4304, wherein the process tool is selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

4307. The system of claim 4293, wherein the measurement device is further coupled to a process chamber of the process tool.

4308. The system of claim 4293, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool.

4309. The system of claim 4293, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

4310. The system of claim 4293, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool, and wherein the stage is configured to move the specimen from the measurement device to the process tool during use.

4311. The system of claim 4293, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool, and wherein the stage is configured to move the specimen to the process chamber of the process tool during use.

4312. The system of claim 4293, wherein the system is further configured to determine at least the one characteristic while the specimen is waiting between process steps.

4313. The system of claim 4293, wherein the process tool comprises a support device configured to support the specimen during the process, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

4314. The system of claim 4293, wherein the process tool comprises a support device configured to support the specimen during the process, and wherein an upper surface of the support device is substantially perpendicular to an upper surface of the stage.

4315. The system of claim 4293, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

4316. The system of claim 4293, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

4317. The system of claim 4293, wherein the stage is disposed within a process chamber of the process tool, and wherein the stage is further configured to support the specimen during the process.

4318. The system of claim 4293, wherein the stage is disposed within a process chamber of the process tool, and wherein the processor is further configured to determine at least the one characteristic during the process.

4319. The system of claim 4293, wherein the stage is disposed within a process chamber of the process tool, and wherein the processor is further configured to obtain a signature characteristic of the process during use, and wherein the signature comprises at least one singularity representative of an end of the process.

4320. The system of claim 4293, wherein the stage is disposed within a process chamber of the process tool, wherein the processor is coupled to the process tool, and wherein the processor is further configured to alter a parameter of an instrument coupled to the process chamber in response to the characteristic using an in situ control technique during use.

4321. The system of claim 4293, wherein the process tool comprises a first process chamber and a second process chamber, wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use, and wherein the processor is further configured to determine at least one characteristic as

the stage is moving the specimen from the first process chamber to the second process chamber.

4322. The system of claim 4293, wherein the processor is further configured to compare at least the one determined characteristic to characteristics of a plurality of specimens during use.

4323. The system of claim 4293, wherein the processor is further configured to compare at least the one determined characteristic to a predetermined range for the characteristic during use.

4324. The system of claim 4293, wherein the processor is further configured to compare at least the one determined characteristic to a predetermined range for the characteristic during use, and wherein the processor is further configured to generate an output signal if at least the one determined characteristic is outside of the predetermined range for the characteristic during use.

4325. The system of claim 4293, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to at least the one determined characteristic during use.

4326. The system of claim 4293, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least the one determined characteristic using a feedback control technique during use.

4327. The system of claim 4293, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to

at least the one determined characteristic using a feedforward control technique during use.

4328. The system of claim 4293, wherein the processor is further configured to generate a database during use, and wherein the database comprises at least the one determined characteristic.

4329. The system of claim 4293, wherein the processor is further configured to generate a database during use, and wherein the processor is further configured to calibrate the measurement device using the database during use.

4330. The system of claim 4293, wherein the processor is further configured to generate a database during use, and wherein the processor is further configured to monitor output signals generated by measurement device using the database during use.

4331. The system of claim 4293, wherein the processor is further configured to generate a database during use, wherein the database comprises at least the one determined characteristic and characteristics of a plurality of specimens, and wherein the characteristics of the plurality of specimens are determined using the measurement device.

4332. The system of claim 4293, wherein the processor is further configured to generate a database during use, wherein the database comprises at least the one determined characteristic and characteristics of a plurality of specimens, and wherein the characteristics of the plurality of specimens are determined using a plurality of measurement devices.

4333. The system of claim 4332, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

4334. The system of claim 4332, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

4335. The system of claim 4293, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

4336. The system of claim 4293, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

4337. The system of claim 4293, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4338. The system of claim 4293, wherein the processor is further coupled to the process tool.

4339. The system of claim 4293, wherein the processor is further coupled to the process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process chamber in response to at least the one determined characteristic using a feedback control technique during use.

4340. The system of claim 4293, wherein the processor is further coupled to the process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process chamber in response to at least the one determined characteristic using a feedforward control technique during use.

4341. The system of claim 4293, wherein the processor is further coupled to the process tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

4342. The system of claim 4293, wherein the processor is further coupled to the process tool, wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use, and wherein the processor is further configured to determine a relationship between at least the one determined characteristic and at least one of the monitored parameters during use.

4343. The system of claim 4293, wherein the processor is further coupled to the process tool, wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use, wherein the processor is further configured to determine a relationship between at least the one determined characteristic and at least one of the monitored parameters during use, and wherein the processor is

further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

4344. The system of claim 4293, wherein the processor is further coupled to a plurality of measurement devices, and wherein at least two of the plurality of measurement devices is coupled to at least one of a plurality of process chambers of the process tool.

4345. The system of claim 4293, wherein the processor is further coupled to a plurality of process tools, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the plurality of process tools during use.

4346. The system of claim 4293, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

4347. The system of claim 4346, wherein the local processor is further configured to determine at least the one characteristic during use.

4348. The system of claim 4346, wherein the remote controller computer is further configured to determine at least the one characteristic during use.

4349. The system of claim 4293, wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, a deposition tool, an ion implanter, a chemical-mechanical polishing tool, a thermal tool, a cleaning tool, and a plating tool.

4350. A method for determining at least one characteristic of micro defects on a specimen, comprising:

processing the specimen in a process tool;

supporting the specimen on a stage;

rotating the stage while the specimen is supported on the stage;

directing light toward a surface of the specimen using an illumination system during the process and during rotation of the stage;

detecting light propagating from the surface of the specimen using a detection system during the process and during rotation of the stage, wherein illumination system and the detection system comprises a measurement device, and wherein the measurement device is coupled to the process tool;

generating one or more output signals responsive to the detected light; and

processing the one or more output signals to determine at least the one characteristic of micro defects on the specimen.

4351. The method of claim 4350, further comprising laterally moving the stage while the specimen is supported on the stage.

4352. The method of claim 4350, wherein an additional illumination system and an additional detection system comprise an additional measurement device coupled to the process tool, the method further comprising processing one or more output signals

generated by the additional measurement device to determine an additional property of the specimen.

4353. The method of claim 4350, wherein the detected light comprises dark field light propagating along a dark field path from the surface of the specimen.

4354. The method of claim 4350, wherein the detected light comprises bright field light propagating along a bright field path from the surface of the specimen.

4355. The method of claim 4350, wherein the detected light comprises dark field light propagating along a dark field path from the surface of the specimen and bright field light propagating along a bright field path from the surface of the specimen.

4356. The method of claim 4350, wherein the detected light comprises dark field light propagating along multiple dark field paths from the surface of the specimen.

4357. The method of claim 4350, wherein the detected light comprises dark field light propagating along multiple dark field paths from the surface of the specimen and bright field light propagating along a bright field path from the surface of the specimen.

4358. The method of claim 4350, wherein the specimen comprises a plurality of dies having repeatable pattern features, and wherein processing the one or more output signals comprises comparing output signals responsive to detected light from at least two of the plurality of dies to determine at least the one characteristic of micro defects on the surface of the specimen.

4359. The method of claim 4350, wherein at least the one characteristic of micro defects is selected from the group consisting of a presence, a location, a number, and a type of micro defects on the surface of the specimen.

4360. The method of claim 4350, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two characteristics of micro defects on the specimen substantially simultaneously.

4361. The method of claim 4350, further comprising directing light toward multiple locations on the surface of the specimen substantially simultaneously during the process and during the rotation of the stage and detecting light propagating from the multiple locations substantially simultaneously during the process and during the rotation of the stage such that at least one characteristic of micro defects on the surface of the specimen at the multiple locations can be determined substantially simultaneously.

4362. The method of claim 4350, further comprising processing the one or more output signals to determine an additional characteristic of the specimen, wherein the additional characteristic is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

4363. The method of claim 4362, wherein the process tool is selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

4364. The method of claim 4350, wherein the measurement device is further coupled to a process chamber of the process tool.

4365. The method of claim 4350, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool.

4366. The method of claim 4350, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool, the method further comprising moving the specimen to the stage with a wafer handler of the process tool.

4367. The method of claim 4350, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool, the method further comprising moving the specimen from the measurement device to the process tool with the stage.

4368. The method of claim 4350, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool, the method further comprising moving the specimen from the measurement device to the process chamber with the stage.

4369. The method of claim 4350, further comprising determining at least the one characteristic while the specimen is waiting between process steps.

4370. The method of claim 4350, further comprising supporting the specimen during a process step with a support device of the process tool, wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

4371. The method of claim 4350, further comprising supporting the specimen during a process step with a support device of the process tool, wherein an upper surface of the support device is substantially perpendicular to an upper surface of the stage.

4372. The method of claim 4350, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

4373. The method of claim 4350, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

4374. The method of claim 4350, wherein the stage is disposed within a process chamber of the process tool, the method further comprising supporting the specimen during a process step with the stage.

4375. The method of claim 4350, wherein the stage is disposed within a process chamber of the process tool, and wherein processing the one or more output signals comprises determining the at least the one characteristic of micro defects on the specimen during the process.

4376. The method of claim 4350, wherein the stage is disposed within a process chamber of the process tool, the method further comprising obtaining a signature characterizing processing of the specimen, wherein the signature comprises at least one singularity representative of an end of the processing of the specimen.

4377. The method of claim 4350, wherein the stage is disposed within a process chamber of the process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least the one determined characteristic using an in situ control technique.

4378. The method of claim 4350, wherein the process tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using the stage.

4379. The method of claim 4350, wherein the process tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using the stage, directing light during said moving, and detecting light during said moving.

4380. The method of claim 4350, further comprising comparing at least the one determined characteristic and characteristics of a plurality of specimens.

4381. The method of claim 4350, further comprising comparing at least the one determined characteristic to a predetermined range for the characteristic.

4382. The method of claim 4381, further comprising generating an output signal if at least the one determined characteristic is outside of the predetermined range.

4383. The method of claim 4350, further comprising altering a sampling frequency of the measurement device in response to at least the one determined characteristic.

4384. The method of claim 4350, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least the one determined characteristic using a feedback control technique.

4385. The method of claim 4350, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least the one determined characteristic using a feedforward control technique.

4386. The method of claim 4350, further comprising generating a database, wherein the database comprises at least the one determined characteristic.

4387. The method of claim 4350, further comprising generating a database, wherein the database comprises at least the one determined characteristic, the method further comprising calibrating the measurement device using the database.

4388. The method of claim 4350, further comprising generating a database, wherein the database comprises at least the one determined characteristic, the method further comprising monitoring output signals generated by the measurement device using the database.

4389. The method of claim 4350, further comprising generating a database, wherein the database comprises at least the one determined characteristic, wherein the database further comprises characteristics of a plurality of specimens, and wherein the characteristics of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

4390. The method of claim 4350, further comprising generating a database, wherein the database comprises at least the one determined characteristic, wherein the database further comprises characteristics of a plurality of specimens, and wherein the characteristics of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals generated by the plurality of measurement devices using the database.

4391. The method of claim 4350, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

4392. The method of claim 4350, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

4393. The method of claim 4350, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4394. The method of claim 4350, further comprising altering a parameter of one or more instruments coupled to the process chamber in response to at least the one determined characteristic using a feedback control technique.

4395. The method of claim 4350, further comprising altering a parameter of one or more instruments coupled to the process chamber in response to at least the one determined characteristic using a feedforward control technique.

4396. The method of claim 4350, further comprising monitoring a parameter of one or more instruments coupled to the process tool.

4397. The method of claim 4350, further comprising monitoring a parameter of one or more instruments coupled to the process tool and determining a relationship between at least the one determined characteristic and at least one of the monitored parameters.

4398. The method of claim 4350, further comprising monitoring a parameter of one or more instruments coupled to the process tool, determining a relationship between at least the one determined characteristic and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

4399. The method of claim 4350, further comprising altering a parameter of one or more instruments coupled to at least one of a plurality of process tools in response to at least the one determined characteristic.

4400. The method of claim 4350, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

4401. The method of claim 4400, wherein at least partially processing the one or more output signals comprises determining the characteristic.

4402. The method of claim 4400, wherein further processing the partially processed one or more output signals comprises determining the characteristic.

4403. The method of claim 4350, wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, a deposition tool, an ion implanter, a chemical-mechanical polishing tool, a thermal tool, a cleaning tool, and a plating tool.

4404. A computer-implemented method for controlling a system configured to determine at least one characteristic of micro defects on a specimen during use, wherein the system comprises a measurement device coupled a stage, wherein the measurement device is further coupled to a process tool, and wherein the process tool is configured to process the specimen during use, the method comprising:

controlling the stage to rotate while the specimen is supported on the stage;

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, comprising:

controlling the illumination system to direct light toward a surface of the specimen during the process and during rotation of the stage;

controlling the detection system to detect light propagating from the surface of the specimen during the process and during rotation of the stage; and

generating one or more output signals responsive to the detected light; and

processing the one or more output signals to determine at least one characteristic of micro defects on the specimen.

4405. The method of claim 4404, further comprising controlling the stage to move laterally while the specimen is supported on the stage.

4406. The method of claim 4404, wherein the system further comprises an additional measurement device coupled to the process tool, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4407. The method of claim 4404, wherein the detected light comprises dark field light propagating along a dark field path from the surface of the specimen.

4408. The method of claim 4404, wherein the detected light comprises bright field light propagating along a bright field path from the surface of the specimen.

4409. The method of claim 4404, wherein the detected light comprises dark field light propagating along a dark field path from the surface of the specimen and bright field light propagating along a bright field path from the surface of the specimen.

4410. The method of claim 4404, wherein the detected light comprises dark field light propagating along multiple dark field paths from the surface of the specimen.

4411. The method of claim 4404, wherein the detected light comprises dark field light propagating along multiple dark field paths from the surface of the specimen and bright field light propagating along a bright field path from the surface of the specimen.

4412. The method of claim 4404, wherein the specimen comprises a plurality of dies having repeatable pattern features, and wherein processing the one or more output signals comprises comparing output signals responsive to detected light from at least two of the plurality of dies to determine at least the one characteristic of micro defects on the specimen.

4413. The method of claim 4404, wherein at least the one characteristic of micro defects is selected from the group consisting of a presence, a location, a number, and a type of micro defects on the surface of the specimen.

4414. The method of claim 4404, wherein processing the one or more output signals to determine at least the one characteristic of micro defects on the specimen comprises substantially simultaneously determining at least two characteristics of micro defects on the specimen.

4415. The method of claim 4404, further comprising controlling the illumination system to direct light toward multiple locations on the surface of the specimen substantially simultaneously during the process and during the rotation of the stage and controlling the detection system to detect light propagating from the multiple locations substantially simultaneously during the process and during the rotation of the stage such that at least one characteristic of micro defects on the surface of the specimen at the multiple locations can be determined substantially simultaneously.

4416. The method of claim 4404, further comprising processing the one or more output signals to determine an additional characteristic of the specimen, wherein the additional characteristic is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

4417. The method of claim 4416, wherein the process tool is selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

4418. The method of claim 4404, wherein the measurement device is further coupled to a process chamber of the process tool.

4419. The method of claim 4404, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool.

4420. The method of claim 4404, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool, the method further comprising controlling a wafer handler coupled to the process tool to move the specimen to the stage.

4421. The method of claim 4404, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool, the method further comprising controlling the stage to move the specimen from the measurement device to the process tool.

4422. The method of claim 4404, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool, the method further comprising controlling the stage to move the specimen from the measurement device to a process chamber of the process tool.

4423. The method of claim 4404, the method further comprising controlling a wafer handler to move the specimen to a stage coupled to the measurement device such that at least the one characteristic can be determined while the specimen is waiting between process steps.

4424. The method of claim 4404, further comprising supporting the specimen during a process step with a support device of the process tool, wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

4425. The method of claim 4404, further comprising supporting the specimen during a process step with a support device of the process tool, wherein an upper surface of the support device is substantially perpendicular to an upper surface of the stage.

4426. The method of claim 4404, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

4427. The method of claim 4404, wherein the measurement device is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

4428. The method of claim 4404, wherein the stage is disposed within a process chamber of the process tool, the method further comprising controlling the stage to support the specimen during a process step.

4429. The method of claim 4404, wherein the stage is disposed within a process chamber of the process tool, the method further comprising processing the one or more output signals to determine the characteristic of the specimen during a process step.

4430. The method of claim 4404, wherein the stage is disposed within a process chamber of the process tool, the method further comprising controlling the measurement device to obtain a signature characterizing processing of the specimen, wherein the

signature comprises at least one singularity representative of an end of the processing of the specimen.

4431. The method of claim 4404, further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least the one determined characteristic using an in situ control technique.

4432. The method of claim 4404, wherein the process tool comprises a first process chamber and a second process chamber, the method further comprising controlling a stage coupled to the measurement device to move the specimen from the first process chamber to the second process chamber.

4433. The method of claim 4404, wherein the process tool comprises a first process chamber and a second process chamber, the method further comprising controlling a stage coupled to the measurement device to move the specimen from the first process chamber to the second process chamber, controlling the illumination system during said moving, and controlling the detection system during said moving.

4434. The method of claim 4404, further comprising comparing at least the one determined characteristic and characteristics of a plurality of specimens.

4435. The method of claim 4404, further comprising comparing at least the one determined characteristic to a predetermined range for the characteristic.

4436. The method of claim 4435, further comprising generating an output signal if at least the one determined characteristic is outside of the predetermined range.

4437. The method of claim 4404, further comprising altering a sampling frequency of the measurement device in response to at least the one determined characteristic.

4438. The method of claim 4404, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least the one determined characteristic using a feedback control technique.

4439. The method of claim 4404, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least the one determined characteristic using a feedforward control technique.

4440. The method of claim 4404, further comprising generating a database, wherein the database comprises at least the one determined characteristic.

4441. The method of claim 4404, further comprising generating a database, wherein the database comprises at least the one determined characteristic, the method further comprising calibrating the measurement device using the database.

4442. The method of claim 4404, further comprising generating a database, wherein the database comprises at least the one determined characteristic, the method further comprising monitoring output signals of the measurement device using the database.

4443. The method of claim 4404, further comprising generating a database, wherein the database comprises at least the one determined characteristic, and wherein the database further comprises characteristics of a plurality of specimens.

4444. The method of claim 4443, wherein the characteristics of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

4445. The method of claim 4443, wherein the characteristics of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

4446. The method of claim 4404, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

4447. The method of claim 4404, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

4448. The method of claim 4404, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4449. The method of claim 4404, further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least the one determined characteristic using a feedback control technique.

4450. The method of claim 4404, further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least the one determined characteristic using a feedforward control technique.

4451. The method of claim 4404, further comprising monitoring a parameter of one or more instruments coupled to the process chamber.

4452. The method of claim 4404, further comprising monitoring a parameter of one or more instruments coupled to the process chamber and determining a relationship between at least the one determined characteristic and at least one of the monitored parameters.

4453. The method of claim 4404, further comprising monitoring a parameter of one or more instruments coupled to the process chamber, determining a relationship between at least the one determined characteristic and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

4454. The method of claim 4404, further comprising altering a parameter of one or more instruments coupled to at least one of a plurality of semiconductor fabrication process tools in response to at least the one determined characteristic.

4455. The method of claim 4404, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processes output signal using the remote controller computer.

4456. The method of claim 4455, wherein at least partially processing the one or more output signals comprises determining the property.

4457. The method of claim 4455, wherein further processing the partially process output signal comprises determining the property.

4458. The method of claim 4404, wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, a deposition tool, an ion implanter, a chemical-mechanical polishing tool, a cleaning tool, a thermal tool, and a plating tool.

4459. A semiconductor device fabricated by a method, the method comprising:

processing a specimen in a process tool to perform at least a step of a semiconductor fabrication process on the specimen;

supporting the specimen on a stage;

rotating the stage while the specimen is supported on the stage;

directing light toward a surface of the specimen using an illumination system during the process and during rotation of the stage;

detecting light propagating from the surface of the specimen using a detection system during the process and during rotation of the stage, wherein illumination system and the detection system comprises a measurement device, and wherein the measurement device is coupled to the process tool;

generating one or more output signals responsive to the detected light; and

processing the one or more output signals to determine at least the one characteristic of micro defects on the specimen.

4460. The device of claim 4459, wherein an additional illumination system and an additional detection system comprise an additional measurement device coupled to the process too, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4461. The device of claim 4459, wherein at least the one characteristic of micro defects is selected from the group consisting of a presence, a location, a number, and a type of micro defects on the surface of the specimen.

4462. The device of claim 4459, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two characteristics of micro defects on the specimen substantially simultaneously.

4463. The device of claim 4459, further comprising directing light toward multiple locations on the surface of the specimen substantially simultaneously during the process and during the rotation of the stage and detecting light propagating from the multiple locations substantially simultaneously during the process and during the rotation of the stage such that at least one characteristic of micro defects on the surface of the specimen at the multiple locations can be determined substantially simultaneously.

4464. The device of claim 4459, further comprising processing the one or more output signals to determine an additional characteristic of the specimen, wherein the additional characteristic is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

4465. The device of claim 4464, wherein the process tool is selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

4466. The device of claim 4459, wherein the measurement device is further coupled to a process chamber of the process tool.

4467. The device of claim 4459, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool.

4468. The device of claim 4459, wherein the measurement device is arranged vertically proximate to a process chamber of the process tool.

4469. The device of claim 4459, wherein the stage is disposed within a process chamber of the process tool, and wherein processing the one or more output signals comprises

determining the at least the one characteristic of micro defects on the specimen during the process.

4470. The device of claim 4459, wherein the stage is disposed within a process chamber of the process tool, the method further comprising obtaining a signature characterizing processing of the specimen, wherein the signature comprises at least one singularity representative of an end of the processing of the specimen.

4471. The device of claim 4459, wherein the stage is disposed within a process chamber of the process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least the one determined characteristic using an in situ control technique.

4472. The device of claim 4459, wherein the process tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using the stage, directing light during said moving, and detecting light during said moving.

4473. The device of claim 4459, wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, a deposition tool, an ion implanter, a chemical-mechanical polishing tool, a thermal tool, a cleaning tool, and a plating tool.

4474. A method for fabricating a semiconductor device, comprising:

disposing the specimen upon a stage, wherein the stage is disposed within a process chamber, wherein a measurement device is coupled to the process chamber, and wherein the measurement device comprises an illumination system and a detection system;

processing the specimen to fabricate a portion of the semiconductor device upon a specimen using a process chamber;

rotating the stage during processing of the specimen;

directing light toward a surface of the specimen using the illumination system during fabrication and rotation of the stage;

detecting light propagating from the surface of the specimen using the detection system during fabrication and rotation of the stage; and

processing the detected light to determine a characteristic of micro defects on the surface of the specimen.

4475. The method of claim 4474, wherein an additional illumination system and an additional detection system comprise an additional measurement device coupled to the process too, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4476. The method of claim 4474, wherein at least the one characteristic of micro defects is selected from the group consisting of a presence, a location, a number, and a type of micro defects on the surface of the specimen.

4477. The method of claim 4474, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two characteristics of micro defects on the specimen substantially simultaneously.

4478. The method of claim 4474, further comprising directing light toward multiple locations on the surface of the specimen substantially simultaneously during the process and during the rotation of the stage and detecting light propagating from the multiple locations substantially simultaneously during the process and during the rotation of the stage such that at least one characteristic of micro defects on the surface of the specimen at the multiple locations can be determined substantially simultaneously.

4479. The method of claim 4474, further comprising processing the one or more output signals to determine an additional characteristic of the specimen, wherein the additional characteristic is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

4480. The method of claim 4479, wherein the process tool is selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

4481. The method of claim 4474, wherein the measurement device is further coupled to a process chamber of the process tool.

4482. The method of claim 4474, wherein the measurement device is arranged laterally proximate to a process chamber of the process tool.

4483. The method of claim 4474, wherein the measurement device is arranged vertically proximate to a process chamber of the process tool.

4484. The method of claim 4474, wherein the stage is disposed within a process chamber of the process tool, and wherein processing the one or more output signals

comprises determining the at least the one characteristic of micro defects on the specimen during the process.

4485. The method of claim 4474, wherein the stage is disposed within a process chamber of the process tool, the method further comprising obtaining a signature characterizing processing of the specimen, wherein the signature comprises at least one singularity representative of an end of the processing of the specimen.

4486. The method of claim 4474, wherein the stage is disposed within a process chamber of the process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least the one determined characteristic using an in situ control technique.

4487. The method of claim 4474, wherein the process tool comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using the stage, directing light during said moving, and detecting light during said moving.

4488. The method of claim 4474, wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, a deposition tool, an ion implanter, a chemical-mechanical polishing tool, a thermal tool, a cleaning tool, and a plating tool.

4489. A system configured to determine a characteristic of micro defects on a specimen during use, comprising:

a process tool configured to process the specimen during use;

a stage configured to support the specimen during use, wherein the stage is further

configured to rotate during use;

a measurement device coupled to the process tool, wherein the measurement device is further coupled to the stage, comprising:

an illumination system configured to direct light toward the surface of the specimen during the process and during rotation of the stage; and

a detection system coupled to the illumination system and configured to detect light propagating from the surface of the specimen during the process and during rotation of the stage, wherein the measurement device is configured to generate one or more output signals in response to the detected light during use; and

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine at least the one characteristic of micro defects on the specimen from the at least partially processed one or more output signals.

4490. A method for determining a characteristic of micro defects on a specimen, comprising:

processing the specimen in a process tool;

supporting the specimen on a stage;

rotating the stage while the specimen is supported on the stage;

directing light toward a surface of the specimen using an illumination system during the process and during rotation of the stage;

detecting light propagating from the surface of the specimen using a detection system during the process and during rotation of the stage, wherein illumination system and the detection system comprises a measurement device, and wherein the measurement device is coupled to the process tool;

generating one or more output signals responsive to the detected light; and

processing the one or more output signals to determine at least the one characteristic of micro defects on the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

4491. A system configured to determine at least one characteristic of defects on at least

two sides of a specimen during use, comprising:

a stage configured to support the specimen during use, wherein the stage is further configured to move during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a front side and a back side of the specimen during movement of the stage; and

a detection system coupled to the illumination system and configured to detect energy propagating along multiple paths from the front side of the specimen during movement of the stage and to detect energy propagating from the back side of the specimen during movement of the stage, wherein the measurement device is configured to generate one or more output signals responsive to the detected energy propagating along multiple paths from the front side of the specimen and the detected energy propagating from the back side of the specimen; and

a processor coupled to the measurement device and configured to determine a first characteristic of defects on the front side of the specimen from the one or more output signals during use and a second characteristic of macro defects on the back side of the specimen from the one or more output signals during use.

4492. The system of claim 4491, further comprising an additional measurement device coupled to the stage, wherein the processor is further configured to determine an additional property of the specimen from one or more output signals generated by the additional measurement device.

4493. The system of claim 4491, wherein the stage is further configured to move laterally during use.

4494. The system of claim 4491, wherein the stage is further configured to move rotatably during use.

4495. The system of claim 4491, wherein the stage is further configured to move laterally and rotatably during use.

4496. The system of claim 4491, wherein the detected energy propagating along multiple paths from the front side comprises dark field light propagating along multiple dark field paths.

4497. The system of claim 4491, wherein the detected energy propagating along multiple paths from the front sides comprises dark field light propagating along multiple dark field paths and bright field light propagating along a bright field path.

4498. The system of claim 4491, wherein the detected energy propagating from the back side of the specimen comprises dark field light propagating along a dark field path.

4499. The system of claim 4491, wherein the detected energy propagating from the back side of the specimen comprises bright field light propagating along a bright field path.

4500. The system of claim 4491, wherein the detected energy propagating from the back side of the specimen comprises dark field light propagating along a dark field path and bright field light propagating along a bright field path.

4501. The system of claim 4491, wherein the measurement device further comprises non-optical components, and wherein the detected energy propagating along multiple paths from the front side of the specimen is responsive to a non-optical characteristic of the specimen.

4502. The system of claim 4491, wherein the measurement device further comprises non-optical components, and wherein the detected energy propagating from the back side of the specimen is responsive to a non-optical characteristic of the specimen.

4503. The system of claim 4491, wherein the specimen comprises a plurality of dies having repeatable pattern features, and wherein the processor is further configured to compare output signals responsive to detected energy from at least two of the plurality of dies to determine the first characteristic.

4504. The system of claim 4491, wherein the first characteristic is selected from the group consisting of a presence, a location, a number, and a type of defects on the front side of the specimen.

4505. The system of claim 4491, wherein the second characteristic is selected from the group consisting of a presence, a location, a number, and a type of defects on the back side of the specimen.

4506. The system of claim 4491, wherein the defects on the front side of the specimen comprise macro defects or micro defects.

4507. The system of claim 4491, wherein the defects on the front side of the specimen comprise macro defects and micro defects.

4508. The system of claim 4491, wherein the processor is further configured to determine the first and second characteristics substantially simultaneously during use.

4509. The system of claim 4491, wherein the illumination system is further configured to direct energy to multiple locations on the front side of the specimen substantially simultaneously during movement of the stage, and wherein the detection system is further configured to detect energy propagating along multiple paths from the multiple locations on the front side of the specimen substantially simultaneously during movement of the stage such that the first characteristic of defects on the front side of the specimen at the multiple locations can be determined substantially simultaneously.

4510. The system of claim 4491, wherein the illumination system is further configured to direct energy to multiple locations on the back side of the specimen substantially simultaneously during movement of the stage, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the back side of the specimen substantially simultaneously during movement of the stage such that the second characteristic of macro defects on the back side of the specimen at the multiple locations can be determined substantially simultaneously.

4511. The system of claim 4491, wherein the processor is further configured to determine a third characteristic of the specimen from the one or more output signals during use, and wherein the third characteristic is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

4512. The system of claim 4511, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

4513. The system of claim 4491, wherein the system is coupled to a process tool.

4514. The system of claim 4491, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

4515. The system of claim 4491, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

4516. The system of claim 4491, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

4517. The system of claim 4491, wherein the system is coupled to a process tool, and wherein the stage is configured to move the specimen from the system to the process tool during use.

4518. The system of claim 4491, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen to a process chamber of the process tool during use.

4519. The system of claim 4491, wherein the system is further configured to determine at least the one characteristic while the specimen is waiting between process steps.

4520. The system of claim 4491, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

4521. The system of claim 4491, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

4522. The system of claim 4491, wherein the system is coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

4523. The system of claim 4491, wherein the system is coupled to a laser cleaning tool.

4524. The system of claim 4491, wherein the system is coupled to a shock wave particle removal apparatus.

4525. The system of claim 4491, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is coupled to a process tool.

4526. The system of claim 4491, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is disposed within the process tool.

4527. The system of claim 4491, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the

measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

4528. The system of claim 4491, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

4529. The system of claim 4491, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

4530. The system of claim 4491, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, wherein the stage is further configured to support the specimen during a process step, and wherein the processor is further configured to determine the first and second characteristics during the process step.

4531. The system of claim 4491, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, wherein the stage is further configured to support the specimen during a process step, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

4532. The system of claim 4491, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, wherein the stage is further configured to support the specimen during a process step, and wherein the processor is

coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined characteristics using an in situ control technique during use.

4533. The system of claim 4491, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

4534. The system of claim 4491, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the system is further configured to determine the first and second characteristics as the stage is moving the specimen from the first process chamber to the second process chamber.

4535. The system of claim 4491, wherein the processor is further configured to compare at least one of the determined characteristics and characteristics of a plurality of specimens during use.

4536. The system of claim 4491, wherein the processor is further configured to compare at least one of the determined characteristics to a predetermined range for the characteristic during use.

4537. The system of claim 4536, wherein the processor is further configured to generate an output signal if at least one of the determined characteristics is outside of the predetermined range for the characteristic during use.

4538. The system of claim 4491, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined characteristics during use.

4539. The system of claim 4491, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined characteristics using a feedback control technique during use.

4540. The system of claim 4491, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined characteristics using a feedforward control technique during use.

4541. The system of claim 4491, wherein the processor is further configured to generate a database during use, and wherein the database comprises the determined first and second characteristics.

4542. The system of claim 4491, wherein the processor is further configured to generate a database during use, and wherein the processor is further configured to calibrate the measurement device using the database during use.

4543. The system of claim 4491, wherein the processor is further configured to generate a database during use, and wherein the processor is further configured to monitor the one or more output signals generated by measurement device using the database during use.

4544. The system of claim 4491, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second

characteristics, and wherein the database further comprises first and second characteristics of a plurality of specimens.

4545. The system of claim 4544, wherein the first and second characteristics of the plurality of specimens are determined using a plurality of measurement devices, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

4546. The system of claim 4544, wherein the first and second characteristics of the plurality of specimens are determined using a plurality of measurement devices, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to monitor one or more output signals generated by the plurality of measurement devices using the database during use.

4547. The system of claim 4491, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

4548. The system of claim 4491, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

4549. The system of claim 4491, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen,

wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4550. The system of claim 4491, wherein the processor is further coupled to a process tool.

4551. The system of claim 4491, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined characteristics using a feedback control technique during use.

4552. The system of claim 4491, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined characteristics using a feedforward control technique during use.

4553. The system of claim 4491, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

4554. The system of claim 4553, wherein the processor is further configured to determine a relationship between at least one of the determined characteristics and at least one of the monitored parameters during use.

4555. The system of claim 4554, wherein the processor is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

4556. The system of claim 4491, wherein the processor is further coupled to a plurality of measurement devices, and wherein at least one of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

4557. The system of claim 4491, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

4558. The system of claim 4557, wherein the local processor is further configured to determine the first characteristic and the second characteristic during use.

4559. The system of claim 4557, wherein the remote controller computer is further configured to determine the first characteristic and the second characteristic during use.

4560. A method for determining at least one characteristic of defects on at least two sides of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

moving the stage;

directing energy toward a front side and a back side of the specimen using the illumination system during movement of the stage;

detecting energy propagating along multiple paths from the front side of the specimen using the detection system during movement of the stage;

detecting energy propagating from the back side of the specimen using the detection system during movement of the stage;

generating one or more output signals responsive to the detected energy propagating along multiple paths from the front side of the specimen and the detected energy propagating from the back side of the specimen; and

processing the one or more output signals to determine a first characteristic of defects on a front side of the specimen and a second characteristic of macro defects on a back side of the specimen.

4561. The method of claim 4560, further comprising moving the stage laterally during said directing energy, said detecting energy propagating along multiple paths from the front side of the specimen, and said detecting energy propagating from the back side of the specimen.

4562. The method of claim 4560, further comprising moving the stage rotatably during said directing energy, said detecting energy propagating along multiple paths from the front side of the specimen, and said detecting energy propagating from the back side of the specimen.

4563. The method of claim 4560, further comprising moving the stage laterally and rotatably during said directing energy, said detecting energy propagating along multiple

paths from the front side of the specimen, and said detecting energy propagating from the back side of the specimen.

4564. The method of claim 4560, wherein the detected light propagating along multiple paths from the front side comprises dark field light propagating along multiple dark field paths.

4565. The method of claim 4560, wherein the detected light propagating along multiple paths from the front sides comprises dark field light propagating along multiple dark field paths and bright field light propagating along a bright field path.

4566. The method of claim 4560, wherein the detected light propagating from the back side of the specimen comprises dark field light propagating along a dark field path.

4567. The method of claim 4560, wherein the detected light propagating from the back side of the specimen comprises bright field light propagating along a bright field path.

4568. The method of claim 4560, wherein the detected light propagating from the back side of the specimen comprises dark field light propagating along a dark field path and bright field light propagating along a bright field path.

4569. The method of claim 4560, wherein the stage is further coupled to an additional measurement device, wherein the additional measurement device comprises an additional illumination system and an additional detection system, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4570. The method of claim 4560, wherein the measurement device further comprises non-optical components, and wherein detecting energy propagating along multiple paths from the front side of the specimen comprises measuring a non-optical characteristic of the front side of the specimen.

4571. The method of claim 4560, wherein the measurement device further comprises non-optical components, and wherein detecting energy propagating from the back side of the specimen comprises a non-optical characteristic of the back side of the specimen.

4572. The method of claim 4560, wherein the specimen comprises a plurality of dies having repeatable pattern features, and wherein processing the one or more output signals comprises comparing detected energy propagating from at least two of the plurality of dies to determine the first characteristic.

4573. The method of claim 4560, wherein the first characteristic is selected from the group consisting of a presence, a location, a number, and a type of defects on the front side of the specimen.

4574. The method of claim 4560, wherein the second characteristic is selected from the group consisting of a presence, a location, a number, and a type of defects on the back side of the specimen.

4575. The method of claim 4560, wherein the defects on the front side of the specimen comprise macro defects or micro defects.

4576. The method of claim 4560, wherein the defects on the front side of the specimen comprise macro defects and micro defects.

4577. The method of claim 4560, further comprising processing the one or more output signals substantially simultaneously to determine the first and second characteristics.

4578. The method of claim 4560, further comprising directing energy toward multiple locations on the front side of the specimen substantially simultaneously during movement of the stage and detecting energy propagating along multiple paths from the multiple locations on the front side of the specimen substantially simultaneously during movement of the stage such that the first characteristic of defects on the front side of the specimen at the multiple locations can be determined substantially simultaneously.

4579. The method of claim 4560, further comprising directing energy toward multiple locations on the back side of the specimen substantially simultaneously during movement of the stage and detecting energy propagating from the multiple locations on the back side of the specimen substantially simultaneously during movement of the stage such that the second characteristic of macro defects on the back side of the specimen at the multiple locations can be determined substantially simultaneously.

4580. The method of claim 4560, further comprising processing the one or more output signals to determine a third characteristic of the specimen, wherein the third characteristic is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

4581. The method of claim 4580, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

4582. The method of claim 4560, wherein the stage and the measurement device are coupled to a process tool.

4583. The method of claim 4560, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

4584. The method of claim 4560, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

4585. The method of claim 4560, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

4586. The method of claim 4560, wherein the stage and the measurement device are coupled to a laser cleaning tool.

4587. The method of claim 4560, wherein the stage and the measurement device are coupled to a shock wave particle removal apparatus.

4588. The method of claim 4560, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

4589. The method of claim 4560, wherein the stage and the measurement device are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to said directing and said detecting using the stage.

4590. The method of claim 4560, further comprising determining at least the one characteristic while the specimen is waiting between process steps.

4591. The method of claim 4560, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

4592. The method of claim 4560, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

4593. The method of claim 4560, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

4594. The method of claim 4560, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within the process tool.

4595. The method of claim 4560, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

4596. The method of claim 4560, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

4597. The method of claim 4560, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

4598. The method of claim 4597, further comprising performing said directing and said detecting during the process step.

4599. The method of claim 4598, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

4600. The method of claim 4598, further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least one of the determined characteristics using an in situ control technique.

4601. The method of claim 4560, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

4602. The method of claim 4601, further comprising performing said directing and said detecting during said moving the specimen from the first process chamber to the second process chamber.

4603. The method of claim 4560, further comprising comparing at least one of the determined characteristics and determined characteristics of a plurality of specimens.

4604. The method of claim 4560, further comprising comparing at least one of the determined characteristics to a predetermined range for the characteristic.

4605. The method of claim 4604, further comprising generating an output signal if at least one of the determined characteristics is outside of the predetermined range for the characteristic.

4606. The method of claim 4560, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined characteristics.

4607. The method of claim 4560, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined characteristics using a feedback control technique.

4608. The method of claim 4560, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined characteristics using a feedforward control technique.

4609. The method of claim 4560, further comprising generating a database, wherein the database comprises the determined first and second characteristics.

4610. The method of claim 4560, further comprising generating a database, wherein the database comprises the determined first and second characteristics, the method further comprising calibrating the measurement device using the database.

4611. The method of claim 4560, further comprising generating a database, wherein the database comprises the determined first and second characteristics, the method further comprising monitoring the measurement device using the database.

4612. The method of claim 4560, further comprising generating a database, wherein the database comprises the determined first and second characteristics, and wherein the database further comprises first and second characteristics of a plurality of specimens.

4613. The method of claim 4612, wherein the first and second characteristics of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

4614. The method of claim 4613, wherein the first and second characteristics of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

4615. The method of claim 4560, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

4616. The method of claim 4560, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

4617. The method of claim 4560, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4618. The method of claim 4560, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined characteristics using a feedback control technique.

4619. The method of claim 4560, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined characteristics using a feedforward control technique.

4620. The method of claim 4560, further comprising monitoring a parameter of one or more instruments coupled to the process tool.

4621. The method of claim 4620, further comprising determining a relationship between at least one of the determined characteristics and at least one of the monitored parameters.

4622. The method of claim 4621, further comprising altering a parameter of at least one of the instruments in response to the relationship.

4623. The method of claim 4560, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to at least one of the determined characteristics.

4624. The method of claim 4560, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

4625. The method of claim 4624, wherein at least partially processing the one or more output signals comprises determining the first and second characteristics.

4626. The method of claim 4624, wherein further processing the partially processed one or more output signals comprises determining the first and second characteristics.

4627. A computer-implemented method for controlling a system configured to determine at least one characteristic of defects on at least two sides of the specimen during use, wherein the system comprises a measurement device, comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, wherein the measurement device is coupled to a stage, and wherein the stage is configured to move during use, comprising:

controlling the illumination system to direct energy toward a front side and a back side of the specimen during movement of the stage;

controlling the detection system to detect energy propagating along multiple paths from the front side of the specimen during movement of the stage and to detect energy propagating from the back side of the specimen during movement of the stage; and

generating one or more output signals responsive to the detected energy propagating along multiple path from the front side of the specimen and the detected energy propagating from the back side of the specimen; and

processing the one or more output signals to determine a first characteristic of defects on a front side of the specimen and to determine a second characteristic of macro defects on a back side of the specimen.

4628. The method of claim 4627, further comprising controlling the stage, wherein the stage is configured to support the specimen.

4629. The method of claim 4627, further comprising controlling the stage to laterally move the stage during said controlling the illumination system and said controlling the detection system.

4630. The method of claim 4627, further comprising controlling the stage to rotatably move the stage during said controlling the illumination system and said controlling the detection system.

4631. The method of claim 4627, further comprising controlling the stage to laterally and rotatably move the stage during said controlling the illumination system and said controlling the detection system.

4632. The method of claim 4627, wherein the detected light propagating along multiple paths from the front side comprises dark field light propagating along multiple dark field paths.

4633. The method of claim 4627, wherein the detected light propagating along multiple paths from the front sides comprises dark field light propagating along multiple dark field paths and bright field light propagating along a bright field path.

4634. The method of claim 4627, wherein the detected light propagating from the back side of the specimen comprises dark field light propagating along a dark field path.

4635. The method of claim 4627, wherein the detected light propagating from the back side of the specimen comprises bright field light propagating along a bright field path.

4636. The method of claim 4627, wherein the detected light propagating from the back side of the specimen comprises dark field light propagating along a dark field path and bright field light propagating along a bright field path.

4637. The method of claim 4627, wherein the system comprises an additional measurement device, wherein the additional measurement device comprises an additional illumination system and an additional detection system, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4638. The method of claim 4627, wherein the measurement device further comprises non-optical components, and wherein controlling the detection system to detect energy comprises controlling the non-optical components to measure a non-optical characteristic of the front side of the specimen.

4639. The method of claim 4627, wherein the measurement device further comprises non-optical components, and wherein controlling the detection system to detect energy comprises controlling the non-optical components to measure a non-optical characteristic of the back side of the specimen.

4640. The method of claim 4627, wherein the specimen comprises a plurality of dies having repeatable pattern features, and wherein processing the one or more output signals comprises comparing detected energy propagating from at least two of the plurality of dies to determine the first characteristic.

4641. The method of claim 4627, wherein the first characteristic is selected from the group consisting of a presence, a location, a number, and a type of defects on the front side of the specimen.

4642. The method of claim 4627, wherein the second characteristic is selected from the group consisting of a presence, a location, a number, and a type of defects on the back side of the specimen.

4643. The method of claim 4627, wherein the defects on the front side of the specimen comprise macro defects or micro defects.

4644. The method of claim 4627, wherein the defects on the back side of the specimen comprise macro defects and micro defects.

4645. The method of claim 4627, wherein processing the one or more output signals to determine the first and second characteristics comprises substantially simultaneously determining the first and second characteristics.

4646. The method of claim 4627, further comprising controlling the illumination system to direct energy to multiple locations on the front side of the specimen substantially simultaneously during movement of the stage and controlling the detection system to detect energy propagating along multiple paths from the multiple locations on the front side of the specimen substantially simultaneously during movement of the stage such that the first characteristic of defects on the front side of the specimen at the multiple locations can be determined substantially simultaneously.

4647. The method of claim 4627, further comprising controlling the illumination system to direct energy toward multiple locations on the back side of the specimen substantially simultaneously during movement of the stage and controlling the detection system to detect energy propagating from the multiple locations on the back side of the specimen substantially simultaneously during movement of the stage such that the second characteristic of macro defects on the back side of the specimen at the multiple locations can be determined substantially simultaneously.

4648. The method of claim 4627, further comprising processing the one or more output signals to determine a third characteristic of the specimen, wherein the third characteristic is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

4649. The method of claim 4648, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

4650. The method of claim 4627, wherein the stage and the measurement device are coupled to a process tool.

4651. The method of claim 4627, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

4652. The method of claim 4627, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

4653. The method of claim 4627, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

4654. The method of claim 4627, wherein the stage and the measurement device are coupled to a laser cleaning tool.

4655. The method of claim 4627, wherein the stage and the measurement device are coupled to a shock wave particle removal apparatus.

4656. The method of claim 4627, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to

move the specimen from the process tool to the stage, wherein the wafer handler is coupled to the process tool.

4657. The method of claim 4627, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling the stage to move the specimen from the system to the process tool.

4658. The method of claim 4627, the method further comprising controlling a wafer handler to move the specimen to a stage coupled to the measurement device such that at least the one characteristic can be determined while the specimen is waiting between process steps.

4659. The method of claim 4627, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

4660. The method of claim 4627, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

4661. The method of claim 4627, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

4662. The method of claim 4627, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within the process tool.

4663. The method of claim 4627, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

4664. The method of claim 4627, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

4665. The method of claim 4627, wherein the stage comprises a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

4666. The method of claim 4665, further comprising controlling the illumination system and controlling the detection system during the process step.

4667. The method of claim 4666, further comprising controlling the system to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

4668. The method of claim 4666, further comprising controlling the system to alter a parameter of one or more instruments coupled to the process tool in response to the at least one of the determined characteristics using an in situ control technique.

4669. The method of claim 4627, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

4670. The method of claim 4669, further comprising controlling the illumination system and controlling the detection system during said moving the specimen from the first process chamber to the second process chamber.

4671. The method of claim 4627, further comprising comparing at least one of the determined characteristics and characteristics of a plurality of specimens.

4672. The method of claim 4627, further comprising comparing at least one of the determined characteristics to a predetermined range for the characteristic.

4673. The method of claim 4672, further comprising generating an output signal if at least one of the determined characteristics is outside of the predetermined range for the characteristic.

4674. The method of claim 4627, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined characteristics.

4675. The method of claim 4627, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined characteristics using a feedback control technique.

4676. The method of claim 4627, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined characteristics using a feedforward control technique.

4677. The method of claim 4627, further comprising generating a database, wherein the database comprises the determined first and second characteristics.

4678. The method of claim 4627, further comprising generating a database, wherein the database comprises the determined first and second characteristics, the method further comprising calibrating the measurement device using the database.

4679. The method of claim 4627, further comprising generating a database, wherein the database comprises the determined first and second characteristics, the method monitoring the measurement device using the database.

4680. The method of claim 4627, further comprising generating a database, wherein the database comprises the determined first and second characteristics, and wherein the database further comprises first and second characteristics of a plurality of specimens.

4681. The method of claim 4680, wherein the first and second characteristics of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

4682. The method of claim 4680, wherein the first and second characteristics of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

4683. The method of claim 4627, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand

alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

4684. The method of claim 4627, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

4685. The method of claim 4627, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4686. The method of claim 4627, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined characteristics using a feedback control technique.

4687. The method of claim 4627, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined characteristics using a feedforward control technique.

4688. The method of claim 4627, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

4689. The method of claim 4688, further comprising determining a relationship between at least one of the determined characteristics and at least one of the monitored parameters.

4690. The method of claim 4688, further comprising altering a parameter of at least one of the instruments in response to the relationship.

4691. The method of claim 4627, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to at least one of the determined characteristics.

4692. The method of claim 4627, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

4693. The method of claim 4692, wherein at least partially processing the one or more output signals comprises determining the first and second characteristics.

4694. The method of claim 4692, wherein further processing the partially processed one or more output signals comprises determining the first and second characteristics.

4695. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

moving the stage;

directing energy toward a front side and a back side of the specimen using the illumination system during movement of the stage;

detecting energy propagating along multiple paths from the front side of the specimen using the detection system during movement of the stage;

detecting energy propagating from the back side of the specimen using the detection system during movement of the stage;

generating one or more output signals responsive to the detected energy propagating along multiple path from the front side of the specimen and the detected energy propagating from the back side of the specimen; and

processing the one or more output signals to determine a first characteristic of defects on the front side of the specimen a second characteristic of macro defects on the back side of the specimen.

4696. The device of claim 4695, wherein the detected light propagating along multiple paths from the front side comprises dark field light propagating along multiple dark field paths.

4697. The device of claim 4695, wherein the detected light propagating along multiple paths from the front sides comprises dark field light propagating along multiple dark field paths and bright field light propagating along a bright field path.

4698. The device of claim 4695, wherein the detected light propagating from the back side of the specimen comprises dark field light propagating along a dark field path.

4699. The device of claim 4695, wherein the detected light propagating from the back side of the specimen comprises bright field light propagating along a bright field path.

4700. The device of claim 4695, wherein the detected light propagating from the back side of the specimen comprises dark field light propagating along a dark field path and bright field light propagating along a bright field path.

4701. The device of claim 4695, wherein the stage is further coupled to an additional measurement device, wherein the additional measurement device comprises an additional illumination system and an additional detection system, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4702. The device of claim 4695, wherein the measurement device further comprises non-optical components, and wherein detecting energy propagating along multiple paths from the front side of the specimen comprises measuring a non-optical characteristic of the front side of the specimen.

4703. The device of claim 4695, wherein the measurement device further comprises non-optical components, and wherein detecting energy propagating from the back side of the specimen comprises a non-optical characteristic of the back side of the specimen.

4704. The device of claim 4695, further comprising processing the one or more output signals substantially simultaneously to determine the first and second characteristics.

4705. The device of claim 4695, further comprising directing energy toward multiple locations on the front side of the specimen substantially simultaneously during movement of the stage and detecting energy propagating along multiple paths from the multiple locations on the front side of the specimen substantially simultaneously during movement of the stage such that the first characteristic of defects on the front side of the specimen at the multiple locations can be determined substantially simultaneously.

4706. The device of claim 4695, further comprising directing energy toward multiple locations on the back side of the specimen substantially simultaneously during movement of the stage and detecting energy propagating from the multiple locations on the back side of the specimen substantially simultaneously during movement of the stage such that the second characteristic of macro defects on the back side of the specimen at the multiple locations can be determined substantially simultaneously.

4707. The device of claim 4695, further comprising processing the one or more output signals to determine a third characteristic of the specimen, wherein the third characteristic is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

4708. The device of claim 4707, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

4709. The device of claim 4695, wherein the stage and the measurement device are coupled to a process tool.

4710. The device of claim 4695, wherein the stage and the measurement device are coupled to a laser cleaning tool.

4711. The device of claim 4695, wherein the stage and the measurement device are coupled to a shock wave particle removal apparatus.

4712. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

moving the stage;

directing energy toward a front side and a back side of the specimen using the illumination system during movement of the stage;

detecting energy propagating along multiple paths from the front side of the specimen using the detection system during movement of the stage;

detecting energy propagating from the back side of the specimen using the detection system during movement of the stage;

generating one or more output signals responsive to the detected energy propagating along multiple path from the front side of the specimen and the detected energy propagating from the back side of the specimen; and

processing the one or more output signals to determine a first characteristic of defects on the front side of the specimen a second characteristic of macro defects on the back side of the specimen.

4713. The method of claim 4712, wherein the detected light propagating along multiple paths from the front side comprises dark field light propagating along multiple dark field paths.

4714. The method of claim 4712, wherein the detected light propagating along multiple paths from the front sides comprises dark field light propagating along multiple dark field paths and bright field light propagating along a bright field path.

4715. The method of claim 4712, wherein the detected light propagating from the back side of the specimen comprises dark field light propagating along a dark field path.

4716. The method of claim 4712, wherein the detected light propagating from the back side of the specimen comprises bright field light propagating along a bright field path.

4717. The method of claim 4712, wherein the detected light propagating from the back side of the specimen comprises dark field light propagating along a dark field path and bright field light propagating along a bright field path.

4718. The method of claim 4712, wherein the stage is further coupled to an additional measurement device, wherein the additional measurement device comprises an additional illumination system and an additional detection system, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

4719. The method of claim 4712, wherein the measurement device further comprises non-optical components, and wherein detecting energy propagating along multiple paths from the front side of the specimen comprises measuring a non-optical characteristic of the front side of the specimen.

4720. The method of claim 4712, wherein the measurement device further comprises non-optical components, and wherein detecting energy propagating from the back side of the specimen comprises a non-optical characteristic of the back side of the specimen.

4721. The method of claim 4712, further comprising processing the one or more output signals substantially simultaneously to determine the first and second characteristics.

4722. The method of claim 4712, further comprising directing energy toward multiple locations on the front side of the specimen substantially simultaneously during movement of the stage and detecting energy propagating along multiple paths from the multiple locations on the front side of the specimen substantially simultaneously during movement of the stage such that the first characteristic of defects on the front side of the specimen at the multiple locations can be determined substantially simultaneously.

4723. The method of claim 4712, further comprising directing energy toward multiple locations on the back side of the specimen substantially simultaneously during movement of the stage and detecting energy propagating from the multiple locations on the back side of the specimen substantially simultaneously during movement of the stage such that the second characteristic of macro defects on the back side of the specimen at the multiple locations can be determined substantially simultaneously.

4724. The method of claim 4712, further comprising processing the one or more output signals to determine a third characteristic of the specimen, wherein the third characteristic is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

4725. The method of claim 4724, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

4726. The method of claim 4712, wherein the stage and the measurement device are coupled to a process tool.

4727. The method of claim 4712, wherein the stage and the measurement device are coupled to a laser cleaning tool.

4728. The method of claim 4712, wherein the stage and the measurement device are coupled to a shock wave particle removal apparatus.

4729. A system configured to determine at least one characteristic of defects on at least two sides of a specimen during use, comprising:

a stage configured to support the specimen during use, wherein the stage is further configured to move during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a front side and a back side of the specimen during movement of the stage; and

a detection system coupled to the illumination system and configured to detect energy propagating along multiple paths from the front side of the specimen during movement of the stage and to detect energy propagating from the back side of the specimen during movement of the stage, wherein the measurement device is configured to generate one or more output signals responsive to the detected energy propagating along multiple paths from the front side of the specimen and the detected energy propagating from the back side of the specimen;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine a first characteristic of defects on the front side of the specimen from the one or more output signals during use and a second characteristic of macro defects on the back side of the specimen from the one or more output signals during use.

4730. A method for determining at least one characteristic of defects on at least two sides of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

moving the stage;

directing energy toward a front side and a back side of the specimen using the illumination system during movement of the stage;

detecting energy propagating along multiple paths from the front side of the specimen using the detection system during movement of the stage;

detecting energy propagating from the back side of the specimen using the detection system during movement of the stage;

generating one or more output signals responsive to the detected energy propagating along multiple paths from the front side of the specimen and the detected energy propagating from the back side of the specimen; and

processing the one or more output signals to determine a first characteristic of defects on the front side of the specimen and a second characteristic of macro defects on the back side of the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the at least partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the at least partially processed one or more output signals using the remote controller computer.

4731. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals responsive to the detected energy during use; and

a processor coupled to the measurement device and configured to determine a first property and a second property of the specimen from the one or more output signals during use, wherein the first property comprises a presence of macro

defects on the specimen, and wherein the second property comprises overlay misregistration of the specimen.

4732. The system of claim 4731, wherein the stage is further configured to move laterally during use.

4733. The system of claim 4731, wherein the stage is further configured to move rotatably during use.

4734. The system of claim 4731, wherein the stage is further configured to move laterally and rotatably during use.

4735. The system of claim 4731, wherein the illumination system comprises a single energy source.

4736. The system of claim 4731, wherein the illumination system comprises more than one energy source.

4737. The system of claim 4731, wherein the detection system comprises a single energy sensitive device.

4738. The system of claim 4731, wherein the detection system comprises more than one energy sensitive devices.

4739. The system of claim 4731, wherein the measurement device further comprises a non-imaging scatterometer.

4740. The system of claim 4731, wherein the measurement device further comprises a scatterometer.

4741. The system of claim 4731, wherein the measurement device further comprises a spectroscopic scatterometer.

4742. The system of claim 4731, wherein the measurement device further comprises a reflectometer.

4743. The system of claim 4731, wherein the measurement device further comprises a spectroscopic reflectometer.

4744. The system of claim 4731, wherein the measurement device further comprises an ellipsometer.

4745. The system of claim 4731, wherein the measurement device further comprises a spectroscopic ellipsometer.

4746. The system of claim 4731, wherein the measurement device further comprises a bright field imaging device.

4747. The system of claim 4731, wherein the measurement device further comprises a dark field imaging device.

4748. The system of claim 4731, wherein the measurement device further comprises a bright field and dark field imaging device.

4749. The system of claim 4731, wherein the measurement device further comprises a non-imaging bright field device.

4750. The system of claim 4731, wherein the measurement device further comprises a non-imaging dark field device.

4751. The system of claim 4731, wherein the measurement device further comprises a non-imaging bright field and dark field device.

4752. The system of claim 4731, wherein the measurement device further comprises a double dark field device.

4753. The system of claim 4731, wherein the measurement device further comprises a coherence probe microscope.

4754. The system of claim 4731, wherein the measurement device further comprises an interferometer.

4755. The system of claim 4731, wherein the measurement device further comprises an optical profilometer.

4756. The system of claim 4731, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright

field and dark field device, a coherence probe microscope, an interferometer, and an optical profilometer.

4757. The system of claim 4731, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

4758. The system of claim 4731, wherein the macro defects comprises resist contamination of a back side of the specimen.

4759. The system of claim 4731, wherein the processor is further configured to determine a third property of the specimen from the one or more output signals during use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

4760. The system of claim 4731, wherein the illumination system is further configured to direct energy toward a bottom surface of the specimen during use, wherein the detection system is further configured to detect energy propagating from the bottom surface of the specimen during use, and wherein the first property further comprises a presence of macro defects on the bottom surface of the specimen.

4761. The system of claim 4731, wherein the system is further configured to determine at least the two properties of the specimen substantially simultaneously during use.

4762. The system of claim 4731, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially

simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

4763. The system of claim 4731, wherein the system is coupled to a process tool.

4764. The system of claim 4731, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

4765. The system of claim 4731, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

4766. The system of claim 4731, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

4767. The system of claim 4731, wherein the system is coupled to a process tool, and wherein the stage is configured to move the specimen from the system to the process tool during use.

4768. The system of claim 4731, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen to a process chamber of the process tool during use.

4769. The system of claim 4731, wherein the system is coupled to a process tool, and wherein the system is further configured to determine at least the two properties of the specimen while the specimen is waiting between process steps.

4770. The system of claim 4731, wherein the system is coupled to a lithography tool, wherein the system is configured to determine the first property of the specimen prior to an exposure step of a lithography process, and wherein the system is configured to determine the second property subsequent to the exposure step of the lithography process.

4771. The system of claim 4731, wherein the system is coupled to a lithography tool, and wherein the system is configured to determine the first and second properties of the specimen subsequent to an exposure step of a lithography process.

4772. The system of claim 4731, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

4773. The system of claim 4731, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

4774. The system of claim 4731, wherein the system is coupled to a process tool, and wherein the process tool comprises a lithography tool.

4775. The system of claim 4731, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is coupled to a process tool.

4776. The system of claim 4731, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is disposed within a process tool.

4777. The system of claim 4731, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

4778. The system of claim 4731, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

4779. The system of claim 4731, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

4780. The system of claim 4779, wherein the processor is further configured to determine one or more of at least the two properties of the specimen during the process step.

4781. The system of claim 4780, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

4782. The system of claim 4780, wherein the processor is further coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique during use.

4783. The system of claim 4731, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

4784. The system of claim 4783, wherein the system is further configured to determine at least one of the two properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

4785. The system of claim 4731, wherein the processor is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

4786. The system of claim 4731, wherein the processor is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

4787. The system of claim 4786, wherein the processor is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

4788. The system of claim 4731, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen during use.

4789. The system of claim 4731, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

4790. The system of claim 4731, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

4791. The system of claim 4731, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the processor is further configured to calibrate the measurement device using the database during use.

4792. The system of claim 4731, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the processor is further configured to monitor output signals generated by measurement device using the database during use.

4793. The system of claim 4731, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens determined using a plurality of measurement devices.

4794. The system of claim 4793, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

4795. The system of claim 4793, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

4796. The system of claim 4731, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

4797. The system of claim 4731, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

4798. The system of claim 4731, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4799. The system of claim 4731, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

4800. The system of claim 4731, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedforward control technique during use.

4801. The system of claim 4731, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

4802. The system of claim 4801, wherein the processor is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

4803. The system of claim 4802, wherein the processor is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

4804. The system of claim 4731, wherein the processor is further coupled to a plurality of measurement devices, and wherein the plurality of measurement devices is coupled to a plurality of process tools.

4805. The system of claim 4731, wherein the processor is further coupled to a plurality of process tools, and wherein the processor is further configured to alter a parameter of

one or more instruments coupled to at least one of the plurality of process tools during use.

4806. The system of claim 4731, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

4807. The system of claim 4806, wherein the local processor is further configured to determine the first property and the second property of the specimen during use.

4808. The system of claim 4806, wherein the remote controller computer is further configured to determine the first property and the second property of the specimen during use.

4809. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of macro defects on the specimen, and wherein the second property comprises overlay misregistration of the specimen.

4810. The method of claim 4809, further comprising laterally moving the stage during said directing energy and said detecting energy.

4811. The method of claim 4809, further comprising rotatably moving the stage during said directing energy and said detecting energy.

4812. The method of claim 4809, further comprising laterally and rotatably moving the stage during said directing energy and said detecting energy.

4813. The method of claim 4809, wherein the illumination system comprises a single energy source.

4814. The method of claim 4809, wherein the illumination system comprises more than one energy source.

4815. The method of claim 4809, wherein the detection system comprises a single energy sensitive device.

4816. The method of claim 4809, wherein the detection system comprises more than one energy sensitive devices.

4817. The method of claim 4809, wherein the measurement device further comprises a non-imaging scatterometer.

4818. The method of claim 4809, wherein the measurement device further comprises a scatterometer.

4819. The method of claim 4809, wherein the measurement device further comprises a spectroscopic scatterometer.

4820. The method of claim 4809, wherein the measurement device further comprises a reflectometer.

4821. The method of claim 4809, wherein the measurement device further comprises a spectroscopic reflectometer.

4822. The method of claim 4809, wherein the measurement device further comprises an ellipsometer.

4823. The method of claim 4809, wherein the measurement device further comprises a spectroscopic ellipsometer.

4824. The method of claim 4809, wherein the measurement device further comprises a bright field imaging device.

4825. The method of claim 4809, wherein the measurement device further comprises a dark field imaging device.

4826. The method of claim 4809, wherein the measurement device further comprises a bright field and dark field imaging device.

4827. The method of claim 4809, wherein the measurement device further comprises a non-imaging bright field device.

4828. The method of claim 4809, wherein the measurement device further comprises a non-imaging dark field device.

4829. The method of claim 4809, wherein the measurement device further comprises a non-imaging bright field and dark field device.

4830. The method of claim 4809, wherein the measurement device further comprises a double dark field device.

4831. The method of claim 4809, wherein the measurement device further comprises a coherence probe microscope.

4832. The method of claim 4809, wherein the measurement device further comprises an interferometer.

4833. The method of claim 4809, wherein the measurement device further comprises an optical profilometer.

4834. The method of claim 4809, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a

spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a coherence probe microscope, an interferometer, and an optical profilometer.

4835. The method of claim 4809, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

4836. The method of claim 4809, wherein the macro defects comprise resist contamination on a back side of the specimen.

4837. The method of claim 4809, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature on the specimen.

4838. The method of claim 4809, further comprising directing energy toward a bottom surface of the specimen and detecting energy propagating from the bottom surface of the specimen, wherein the first property further comprises a presence of macro defects on the bottom surface of the specimen.

4839. The method of claim 4809, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

4840. The method of claim 4809, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

4841. The method of claim 4809, wherein the stage and the measurement device are coupled to a process tool.

4842. The method of claim 4809, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

4843. The method of claim 4809, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

4844. The method of claim 4809, wherein the stage and the measurement device are coupled to a lithography tool.

4845. The method of claim 4809, wherein the stage and the measurement device are coupled to a lithography tool, the method further comprising determining the first property prior to an exposure step of the lithography process and determining the second property subsequent to the exposure step of the lithography process.

4846. The method of claim 4809, wherein the stage and the measurement device are coupled to a lithography tool, the method further comprising determining the first and second properties subsequent to an exposure step of a lithography process.

4847. The method of claim 4809, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

4848. The method of claim 4809, wherein the stage and the measurement device are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to said directing and said detecting using the stage.

4849. The method of claim 4809, wherein the stage and the measurement device are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

4850. The method of claim 4809, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

4851. The method of claim 4809, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

4852. The method of claim 4809, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

4853. The method of claim 4809, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

4854. The method of claim 4809, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

4855. The method of claim 4809, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

4856. The method of claim 4809, wherein the stage and the measurement device are disposed within a measurement chamber, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

4857. The method of claim 4856, further comprising performing said directing and said detecting during the process step.

4858. The method of claim 4857, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

4859. The method of claim 4857, further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

4860. The method of claim 4809, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

4861. The method of claim 4860, further comprising performing said directing and said detecting during said moving the specimen from the first process chamber to the second process chamber.

4862. The method of claim 4809, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

4863. The method of claim 4809, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

4864. The method of claim 4863, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

4865. The method of claim 4809, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

4866. The method of claim 4809, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

4867. The method of claim 4809, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

4868. The method of claim 4809, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen.

4869. The method of claim 4809, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising calibrating the measurement device using the database.

4870. The method of claim 4809, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising monitoring output signals of the measurement device using the database.

4871. The method of claim 4809, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

4872. The method of claim 4871, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

4873. The method of claim 4871, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further

comprising monitoring output signals of the plurality of measurement devices using the database.

4874. The method of claim 4809, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

4875. The method of claim 4809, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

4876. The method of claim 4809, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4877. The method of claim 4809, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties using a feedback control technique.

4878. The method of claim 4809, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties using a feedforward control technique.

4879. The method of claim 4809, further comprising monitoring a parameter of one or more instruments coupled to the process tool.

4880. The method of claim 4879, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters.

4881. The method of claim 4880, further comprising altering a parameter of at least one of the instruments in response to the relationship.

4882. The method of claim 4809, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to at least one of the determined properties of the specimen.

4883. The method of claim 4809, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

4884. The method of claim 4883, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

4885. The method of claim 4883, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

4886. A computer-implemented method for controlling a system configured to determine at least two properties of a specimen during use, wherein the system comprises a measurement device, the method comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, and wherein the measurement device is coupled to a stage, comprising:

controlling the illumination system to direct energy toward a surface of the specimen;

controlling the detection system to detect energy propagating from the surface of the specimen; and

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of macro defects on the specimen, and wherein the second property comprises overlay misregistration of the specimen.

4887. The method of claim 4886, further comprising controlling the stage, wherein the stage is configured to support the specimen.

4888. The method of claim 4886, further comprising controlling the stage to laterally move the stage during said directing energy and said detecting energy.

4889. The method of claim 4886, further comprising controlling the stage to rotatably move the stage during said directing energy and said detecting energy.

4890. The method of claim 4886, further comprising controlling the stage to laterally and rotatably move the stage during said directing energy and said detecting energy.

4891. The method of claim 4886, wherein the illumination system comprises a single energy source.

4892. The method of claim 4886, wherein the illumination system comprises more than one energy source.

4893. The method of claim 4886, wherein the detection system comprises a single energy sensitive device.

4894. The method of claim 4886, wherein the detection system comprises more than one energy sensitive device.

4895. The method of claim 4886, wherein the measurement device further comprises a non-imaging scatterometer.

4896. The method of claim 4886, wherein the measurement device further comprises a scatterometer.

4897. The method of claim 4886, wherein the measurement device further comprises a spectroscopic scatterometer.

4898. The method of claim 4886, wherein the measurement device further comprises a reflectometer.

4899. The method of claim 4886, wherein the measurement device further comprises a spectroscopic reflectometer.

4900. The method of claim 4886, wherein the measurement device further comprises an ellipsometer.

4901. The method of claim 4886, wherein the measurement device further comprises a spectroscopic ellipsometer.

4902. The method of claim 4886, wherein the measurement device further comprises a bright field imaging device.

4903. The method of claim 4886, wherein the measurement device further comprises a dark field imaging device.

4904. The method of claim 4886, wherein the measurement device further comprises a bright field and dark field imaging device.

4905. The method of claim 4886, wherein the measurement device further comprises a non-imaging bright field device.

4906. The method of claim 4886, wherein the measurement device further comprises a non-imaging dark field device.

4907. The method of claim 4886, wherein the measurement device further comprises a non-imaging bright field and dark field device.

4908. The method of claim 4886, wherein the measurement device further comprises a double dark field device.

4909. The method of claim 4886, wherein the measurement device further comprises a coherence probe microscope.

4910. The method of claim 4886, wherein the measurement device further comprises an interferometer.

4911. The method of claim 4886, wherein the measurement device further comprises an optical profilometer.

4912. The method of claim 4886, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright

field and dark field device, a coherence probe microscope, an interferometer, and an optical profilometer.

4913. The method of claim 4886, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

4914. The method of claim 4886, wherein the macro defects comprise resist contamination on a back side of the specimen.

4915. The method of claim 4886, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature on the specimen.

4916. The method of claim 4886, further comprising controlling the illumination system to direct energy toward a bottom surface of the specimen and controlling the detection system to detect energy propagating from the bottom surface of the specimen, wherein the first property comprises a presence of defects on the bottom surface of the specimen.

4917. The method of claim 4886, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

4918. The method of claim 4886, further comprising controlling the illumination system to direct energy toward multiple locations on the surface of the specimen substantially simultaneously and controlling the detection system to detect energy propagating from the

multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

4919. The method of claim 4886, wherein the stage and the measurement device are coupled to a process tool.

4920. The method of claim 4886, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

4921. The method of claim 4886, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

4922. The method of claim 4886, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool comprises a lithography tool.

4923. The method of claim 4886, wherein the system is coupled to a lithography tool, the method further comprising controlling the system to determine the first property prior to an exposure step of the lithography process and controlling the system to determine the second property subsequent to the exposure step of the lithography process.

4924. The method of claim 4886, wherein the system is coupled to a lithography tool, the method further comprising controlling the system to determine the first and second properties subsequent to an exposure step of a lithography process.

4925. The method of claim 4886, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage, and wherein the wafer handler is coupled to the process tool.

4926. The method of claim 4886, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling the stage to move the specimen from the system to the process tool.

4927. The method of claim 4886, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage such that at least the two properties of the specimen can be determined while the specimen is waiting between process steps.

4928. The method of claim 4886, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

4929. The method of claim 4886, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

4930. The method of claim 4886, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

4931. The method of claim 4886, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

4932. The method of claim 4886, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

4933. The method of claim 4886, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

4934. The method of claim 4886, further comprising disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

4935. The method of claim 4934, further comprising controlling the illumination system and controlling the detection system during the process step to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

4936. The method of claim 4934, further comprising controlling the illumination system and controlling the detection system during the process step to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

4937. The method of claim 4886, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

4938. The method of claim 4937, further comprising controlling the illumination system and controlling the detection system during said moving the specimen from the first process chamber to the second process chamber.

4939. The method of claim 4886, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

4940. The method of claim 4886, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

4941. The method of claim 4940, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

4942. The method of claim 4886, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

4943. The method of claim 4886, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

4944. The method of claim 4886, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

4945 The method of claim 4886, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising calibrating the measurement device using the database.

4946. The method of claim 4886, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising monitoring output signals of the measurement device using the database.

4947. The method of claim 4886, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises determined first and second properties of a plurality of specimens.

4948. The method of claim 4947, wherein the determined first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

4949. The method of claim 4947, wherein the determined first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

4950. The method of claim 4886, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

4951. The method of claim 4886, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

4952. The method of claim 4886, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

4953. The method of claim 4886, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties using a feedback control technique.

4954. The method of claim 4886, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties using a feedforward control technique.

4955. The method of claim 4886, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

4956. The method of claim 4955, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters.

4957. The method of claim 4956, further comprising altering a parameter of at least one of the instruments in response to the relationship.

4958. The method of claim 4886, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to at least one of the determined properties of the specimen.

4959. The method of claim 4886, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

4960. The method of claim 4959, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

4961. The method of claim 4959, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

4962. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of macro defects on the specimen, and wherein the second property comprises overlay misregistration of the specimen.

4963. The device of claim 4962, wherein the illumination system comprises a single energy source.

4964. The device of claim 4962, wherein the illumination system comprises more than one energy source.

4965. The device of claim 4962, wherein the detection system comprises a single energy sensitive device.

4966. The device of claim 4962, wherein the detection system comprises more than one energy sensitive devices.

4967. The device of claim 4962, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a coherence probe microscope, an interferometer, and an optical profilometer.

4968. The device of claim 4962, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a coherence probe microscope, an interferometer, and an optical profilometer.

4969. The device of claim 4962, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

4970. The device of claim 4962, further comprising directing energy toward a bottom surface of the specimen and detecting energy propagating from the bottom surface of the specimen, wherein the first property further comprises a presence of macro defects on the bottom surface of the specimen.

4971. The device of claim 4962, wherein the macro defects comprise resist contamination on a back side of the specimen.

4972. The device of claim 4962, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature on the specimen.

4973. The device of claim 4962, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

4974. The device of claim 4962, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

4975. The device of claim 4962, wherein the stage and the measurement device are coupled to a process tool.

4976. The device of claim 4962, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool comprises a lithography tool.

4977. The device of claim 4962, wherein the stage and the measurement device are coupled to a lithography tool, the method further comprising determining the first property prior to an exposure step of the lithography process and determining the second property subsequent to the exposure step of the lithography process.

4978. The device of claim 4962, wherein the stage and the measurement device are coupled to a lithography tool, the method further comprising determining the first and second properties subsequent to an exposure step of a lithography process.

4979. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of macro defects on the specimen, and wherein the second property comprises overlay misregistration of the specimen.

4980. The method of claim 4979, wherein the illumination system comprises a single energy source.

4981. The method of claim 4979, wherein the illumination system comprises more than one energy source.

4982. The method of claim 4979, wherein the detection system comprises a single energy sensitive device.

4983. The method of claim 4979, wherein the detection system comprises more than one energy sensitive devices.

4984. The method of claim 4979, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a coherence probe microscope, an interferometer, and an optical profilometer.

4985. The method of claim 4979, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a coherence probe microscope, an interferometer, and an optical profilometer.

4986. The method of claim 4979, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

4987. The method of claim 4979, further comprising directing energy toward a bottom surface of the specimen and detecting energy propagating from the bottom surface of the specimen, wherein the first property further comprises a presence of macro defects on the bottom surface of the specimen.

4988. The method of claim 4979, wherein the macro defects comprise resist contamination on a back side of the specimen.

4989. The method of claim 4979, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature on the specimen.

4990. The method of claim 4979, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

4991. The method of claim 4979, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

4992. The method of claim 4979, wherein the stage and the measurement device are coupled to a process tool.

4993. The method of claim 4979, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool comprises a lithography tool.

4994. The method of claim 4979, wherein the stage and the measurement device are coupled to a lithography tool, the method further comprising determining the first property prior to an exposure step of the lithography process and determining the second property subsequent to the exposure step of the lithography process.

4995. The method of claim 4979, wherein the stage and the measurement device are coupled to a lithography tool, the method further comprising determining the first and second properties subsequent to an exposure step of a lithography process.

4996. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals responsive to the detected energy during use;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine a first property and a second property of the specimen from the at least partially processed one or more output signals during use, wherein the first property comprises a presence of macro defects on the specimen, and wherein the second property comprises overlay misregistration of the specimen.

4997. The system of claim 4996, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-

imaging dark field device, a non-imaging bright field and dark field device, a coherence probe microscope, an interferometer, and an optical profilometer.

4998. The system of claim 4996, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a coherence probe microscope, an interferometer, and an optical profilometer.

4999. The system of claim 4996, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

5000. The system of claim 4996, wherein the macro defects comprise resist contamination on a back side of the specimen.

5001. The system of claim 4996, wherein the remote controller computer is further configured to determine a third property of the specimen from the one or more output signals during use, and wherein the third property is selected from the group consisting of a roughness on the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5002. The system of claim 4996, wherein the illumination system is further configured to direct energy toward a bottom surface of the specimen during use, wherein the detection system is further configured to detect energy propagating from the bottom surface of the specimen during use, and wherein the first property further comprises a presence of macro defects on the bottom surface of the specimen.

5003. The system of claim 4996, wherein the system is further configured to determine at least the two properties of the specimen substantially simultaneously during use.

5004. The system of claim 4996, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously during use, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined substantially simultaneously.

5005. The system of claim 4996, wherein the remote controller computer is further coupled to a process tool.

5006. The system of claim 4996, wherein the remote controller computer is further coupled to a process tool, and wherein the process tool comprises a lithography tool.

5007. The system of claim 4996, wherein the system is coupled to a lithography tool, wherein the system is configured to determine the first property prior to an exposure step of the lithography process, and wherein the system is configured to determine the second property subsequent to the exposure step of the lithography process.

5008. The system of claim 4996, wherein the system is coupled to a lithography tool, and wherein the system is further configured to determine the first and second properties subsequent to an exposure step of the lithography process.

5009. The system of claim 4996, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

5010. The system of claim 4996, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedforward control technique during use.

5011. The system of claim 4996, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

5012. The system of claim 4996, wherein the remote controller computer is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

5013. The system of claim 5012, wherein the remote controller computer is further configured to alter a parameter of one or more instruments in response to the relationship during use.

5014. The system of claim 4996, wherein the illumination system is further configured to direct energy toward the surface of the specimen during a process step, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during the process step, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during the process step.

5015. The system of claim 5014, wherein the remote controller computer is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

5016. The system of claim 5014, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique during use.

5017. The system of claim 4996, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

5018. The system of claim 4996, wherein the illumination system is further configured to direct energy toward the surface of the specimen during said moving, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during said moving, and wherein the remote controller computer is further

configured to determine the first and second properties of the specimen during said moving.

5019. The system of claim 4996, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

5020. The system of claim 4996, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

5021. The system of claim 5020, wherein the remote controller computer is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

5022. The system of claim 4996, wherein the remote controller computer is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen during use.

5023. The system of claim 4996, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

5024. The system of claim 4996, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

5025. The system of claim 4996, wherein the remote controller computer is further configured to generate a database during use, and wherein the database comprises the determined first and second properties of the specimen.

5026. The system of claim 4996, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the remote controller computer is further configured to calibrate the measurement device using the database during use.

5027. The system of claim 4996, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the remote controller computer is further configured to monitor output signals generated by measurement device using the database during use.

5028. The system of claim 4996, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

5029. The system of claim 5028, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

5030. The system of claim 5028, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

5031. The system of claim 4996, wherein the remote controller computer is further coupled to a plurality of measurement devices, and wherein the plurality of measurement devices is coupled to at least one of a plurality of process tools.

5032. The system of claim 4996, wherein the remote controller computer is further coupled to a plurality of process tools, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the plurality of process tools during use.

5033. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of macro defects on the specimen, and wherein the second property comprises overlay misregistration of the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

5034. The method of claim 5033, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a coherence probe microscope, an interferometer, and an optical profilometer.

5035. The method of claim 5033, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field

imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a coherence probe microscope, an interferometer, and an optical profilometer.

5036. The method of claim 5033, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

5037. The method of claim 5033, further comprising directing energy toward a bottom surface of the specimen and detecting energy propagating from the bottom surface of the specimen, wherein the first property further comprises a presence of macro defects on the bottom surface of the specimen.

5038. The method of claim 5033, wherein the macro defects comprise resist contamination on a back side of the specimen.

5039. The method of claim 5033, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature on the specimen.

5040. The method of claim 5033, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

5041. The method of claim 5033, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determine at the multiple locations substantially simultaneously.

5042. The method of claim 5033, wherein the remote controller computer is further coupled to a process tool.

5043. The method of claim 5033, wherein the remote controller computer is further coupled to a process tool, and wherein the process tool is comprises a lithography tool.

5044. The method of claim 5033, wherein the stage and the measurement device are coupled to a lithography tool, the method further comprising determining the first property prior to an exposure step of the lithography process and determining the second property subsequent to the exposure step of the lithography process.

5045. The method of claim 5033, wherein the stage and the measurement device are coupled to a lithography tool, the method further comprising determining the first and second properties subsequent to the exposure step of the lithography process.

5046. The method of claim 5033, wherein the remote controller computer is further coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen using a feedback control technique.

5047. The method of claim 5033, wherein the remote controller computer is further coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen using a feedforward control technique.

5048. The method of claim 5033, wherein the remote controller computer is further coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer.

5049. The method of claim 5048, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters using the remote controller computer.

5050. The method of claim 5049, further comprising altering a parameter of one or more instruments coupled to the process tool in response to the relationship using the remote controller computer.

5051. The method of claim 5033, wherein the illumination system and the detection system are coupled to a process chamber of a process tool, the method further comprising performing said directing and said detecting during a process step.

5052. The method of claim 5051, further comprising obtaining a signature characterizing the process step using the remote controller computer, wherein the signature comprises at least one singularity representative of an end of the process step.

5053. The method of claim 5051, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties using an in situ control technique.

5054. The method of claim 5033, further comprising:

moving the specimen from a first process chamber to a second process chamber using the stage; and

performing said directing and said detecting during said moving the specimen.

5055. The method of claim 5054, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens using the remote controller computer.

5056. The method of claim 5054, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property using the remote controller computer.

5057. The method of claim 5056, further comprising generating an output signal using the remote controller computer if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

5058. The method of claim 5033, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

5059. The method of claim 5033, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedback control technique.

5060. The method of claim 5033, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedforward control technique.

5061. The method of claim 5033, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen, the method further comprising calibrating the measurement device using the remote controller computer and the database.

5062. The method of claim 5033, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen, the method further comprising monitoring the measurement device using the remote controller computer and the database.

5063. The method of claim 5033, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

5064. The method of claim 5063, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the remote controller computer and the database.

5065. The method of claim 5063, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the remote controller computer and the database.

5066. The method of claim 5033, further comprising sending the at least partially processed one or more output signals from a plurality of local processors to the remote controller computer, wherein each of the plurality of local processors is coupled to one of a plurality of measurement devices.

5067. The method of claim 5066, wherein at least one of the plurality of measurement devices is coupled to a process tool.

5068. The method of claim 5067, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen.

5069. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a first measurement device coupled to the stage, wherein the first measurement device is configured to generate one or more output signals responsive to at least one thin film characteristic of the specimen during use;

a second measurement device coupled to the stage, wherein the second measurement device is configured to generate one or more output signals responsive to at least one electrical property of the specimen during use; and

a processor coupled to the first measurement device and the second measurement device, wherein the processor is configured to determine the at least one thin film characteristic from the one or more output signals of the first measurement device during use and to determine the at least one electrical property of the specimen from the one or more output signals of the second measurement device during use.

5070. The system of claim 5069, wherein the stage is further configured to move laterally during use.

5071. The system of claim 5069, wherein the stage is further configured to move rotatably during use.

5072. The system of claim 5069, wherein the stage is further configured to move laterally and rotatably during use.

5073. The system of claim 5069, wherein the first measurement device comprises a reflectometer.

5074. The system of claim 5069, wherein the first measurement device comprises a spectroscopic reflectometer.

5075. The system of claim 5069, wherein the first measurement device comprises an ellipsometer.

5076. The system of claim 5069, wherein the first measurement device comprises a spectroscopic ellipsometer.

5077. The system of claim 5069, wherein the first measurement device comprises a beam profile ellipsometer.

5078. The system of claim 5069, wherein the first measurement device comprises a photo-acoustic device.

5079. The system of claim 5069, wherein the first measurement device comprises an eddy current device.

5080. The system of claim 5069, wherein the first measurement device comprises an X-ray reflectometer.

5081. The system of claim 5069, wherein the first measurement device comprises a grazing X-ray reflectometer.

5082. The system of claim 5069, wherein the first measurement device comprises an X-ray diffractometer.

5083. The system of claim 5069, wherein the first measurement device comprises at least two measurement devices, and wherein the at least two measurement devices are selected from the group consisting of a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a beam profile ellipsometer, a photo-acoustic device, an eddy current device, an X-ray reflectometer, a grazing X-ray reflectometer, and an X-ray diffractometer.

5084. The system of claim 5069, wherein at least one element of the first measurement device comprise at least one element of the second measurement device.

5085. The system of claim 5069, wherein the second measurement device comprises:

an oven configured to anneal the specimen;

a cooling device configured to reduce a temperature of the specimen subsequent to an annealing process;

a device configured to deposit a charge on an upper surface of the specimen; and

a sensor configured to measure the at least one electrical property of the charged upper surface of the specimen.

5086. The system of claim 5069, wherein the at least one electrical property of the specimen is selected from the group consisting of a capacitance, a dielectric constant, and a resistivity.

5087. The system of claim 5069, wherein the at least one electrical property comprises at least one electrical property of a layer on the specimen, and wherein the layer comprises a dielectric material formed on the specimen.

5088. The system of claim 5069, wherein the processor is further configured to determine a characteristic of metal contamination on the specimen from the one or more output signals of the second measurement device during use.

5089. The system of claim 5069, wherein the processor is further configured to determine a third property of the specimen from the one or more output signals of the first or second measurement device during use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5090. The system of claim 5069, wherein the system is further configured to determine the at least two properties of the specimen substantially simultaneously during use.

5091. The system of claim 5069, wherein the first measurement device is further configured to generate the one or more output signals responsive to the at least one thin film characteristic of the specimen at multiple locations on the specimen substantially simultaneously during use, and wherein the processor is further configured to determine the at least one thin film characteristic at the multiple locations on the specimen from the one or more output signals during use.

5092. The system of claim 5069, wherein the second measurement device is further configured to generate the one or more output signals responsive to the at least one electrical property of the specimen at multiple locations on the specimen substantially simultaneously during use, and wherein the processor is further configured to determine the at least one electrical property at the multiple locations on the specimen from the one or more output signals during use.

5093. The system of claim 5069, wherein the system is coupled to a process tool.

5094. The system of claim 5069, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

5095. The system of claim 5069, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

5096. The system of claim 5069, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

5097. The system of claim 5069, wherein the system is coupled to a process tool, and wherein the stage is configured to move the specimen from the system to the process tool during use.

5098. The system of claim 5069, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen to a process chamber of the process tool during use.

5099. The system of claim 5069, wherein the system is coupled to a process tool, and wherein the system is further configured to determine at least the two properties of the specimen while the specimen is waiting between process steps.

5100. The system of claim 5069, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

5101. The system of claim 5069, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

5102. The system of claim 5069, wherein the system is coupled to a process tool selected from the group consisting of a chemical vapor deposition tool, an atomic layer deposition tool, a physical vapor deposition tool, a plating tool, a chemical-mechanical polishing tool, a thermal tool, a cleaning tool, an ion implanter, and an etch tool.

5103. The system of claim 5069, wherein the system further comprises a measurement chamber, wherein the stage and the first and second measurement devices are disposed within the measurement chamber, and wherein the measurement chamber is coupled to a process tool.

5104. The system of claim 5069, wherein the system further comprises a measurement chamber, wherein the stage and the first and second measurement devices are disposed within the measurement chamber, and wherein the measurement chamber is disposed within a process tool.

5105. The system of claim 5069, wherein the system further comprises a measurement chamber, wherein the stage and the first and second measurement devices are disposed within the measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

5106. The system of claim 5069, wherein the system further comprises a measurement chamber, wherein the stage and the first and second measurement devices are disposed within the measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

5107. The system of claim 5069, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

5108. The system of claim 5107, wherein the system is further configured to determine one or more of the at least two properties of the specimen during the process step.

5109. The system of claim 5108, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

5110. The system of claim 5108, wherein the processor is coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the one or more of the at least two properties using an in situ control technique during use.

5111. The system of claim 5069, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

5112. The system of claim 5111, wherein the system is further configured to determine one or more of the at least two properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

5113. The system of claim 5069, wherein the processor is further configured to compare one or more of the at least two properties of the specimen and properties of a plurality of specimens during use.

5114. The system of claim 5069, wherein the processor is further configured to compare one or more of the at least two properties of the specimen to a predetermined range for the one or more properties during use.

5115. The system of claim 5114, wherein the processor is further configured to generate an output signal if one or more of the at least two properties of the specimen is outside of the predetermined range for the property during use.

5116. The system of claim 5069, wherein the processor is further configured to alter a sampling frequency of the first measurement device in response to the at least one thin film characteristic of the specimen during use.

5117. The system of claim 5069, wherein the processor is further configured to alter a sampling frequency of the second measurement device in response to the at least one electrical property of the specimen during use.

5118. The system of claim 5069, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the first measurement device in response to the at least one thin film characteristic of the specimen using a feedback control technique during use.

5119. The system of claim 5069, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the second measurement device in response to the at least one electrical property of the specimen using a feedback control technique during use.

5120. The system of claim 5069, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the first measurement device in response to the at least one thin film characteristic of the specimen using a feedforward control technique during use.

5121. The system of claim 5069, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the second measurement device in response to the at least one electrical property of the specimen using a feedforward control technique during use.

5122. The system of claim 5069, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, and wherein the processor is further configured to calibrate the first and second measurement devices using the database during use.

5123. The system of claim 5069, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, and wherein the processor is further configured to monitor output signals generated by the first and second measurement devices using the database during use.

5124. The system of claim 5069, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, and wherein the database further comprises the at least one thin film characteristic and the at least one electrical property of a plurality of specimens.

5125. The system of claim 5124, wherein the at least one thin film characteristic and the at least one electrical property of the plurality of specimens are determined using a plurality of measurement devices, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

5126. The system of claim 5124, wherein the at least one thin film characteristic and the at least one electrical property of the plurality of specimens are determined using a plurality of measurement devices, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

5127. The system of claim 5069, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

5128. The system of claim 5069, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

5129. The system of claim 5069, wherein the system is further configured to determine the at least one thin film characteristic at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to

the at least one thin film characteristic of the specimen at the more than one position on the specimen to reduce within wafer variation of the at least one thin film characteristic.

5130. The system of claim 5069, wherein the system is further configured to determine the at least one electrical property at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to the at least one electrical property of the specimen at the more than one position on the specimen to reduce within wafer variation of the at least one electrical property.

5131. The system of claim 5069, wherein the processor is further coupled to a process tool.

5132. The system of claim 5069, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties of the specimen using a feedback control technique during use.

5133. The system of claim 5069, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties of the specimen using a feedforward control technique during use.

5134. The system of claim 5069, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

5135. The system of claim 5134, wherein the processor is further configured to determine a relationship between one or more of the at least two properties of the specimen and at least one of the monitored parameters during use.

5136. The system of claim 5135, wherein the processor is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

5137. The system of claim 5069, wherein the processor comprises a local processor coupled to the first and second measurement devices and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals from the first and second measurement devices during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

5138. The system of claim 5137, wherein the local processor is further configured to determine the at least one thin film characteristic and the at least one electrical property of the specimen during use.

5139. The system of claim 5137, wherein the remote controller computer is further configured to determine the at least one thin film characteristic and the at least one electrical property of the specimen during use.

5140. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a first measurement device and a second measurement device;

generating one or more output signals responsive to at least one thin film characteristic of the specimen with the first measurement device;

generating one or more output signals responsive to at least one electrical property of the specimen with the second measurement device;

processing the one or more output signals from the first measurement device to determine the at least one thin film characteristic of the specimen; and

processing the one or more output signals from the second measurement device to determine the at least one electrical property of the specimen.

5141. The method of claim 5140, further comprising laterally moving the stage while determining the at least two properties of the specimen.

5142. The method of claim 5140, further comprising rotatably moving the stage while determining the at least two properties of the specimen.

5143. The method of claim 5140, further comprising laterally and rotatably moving the stage while determining the at least two properties of the specimen.

5144. The method of claim 5140, wherein the first measurement device comprises a reflectometer.

5145. The method of claim 5140, wherein the first measurement device comprises a spectroscopic reflectometer.

5146. The method of claim 5140, wherein the first measurement device comprises an ellipsometer.

5147. The method of claim 5140, wherein the first measurement device comprises a spectroscopic ellipsometer.

5148. The method of claim 5140, wherein the first measurement device comprises a beam profile ellipsometer.

5149. The method of claim 5140, wherein the first measurement device comprises a photo-acoustic device.

5150. The method of claim 5140, wherein the first measurement device comprises an eddy current device.

5151. The method of claim 5140, wherein the first measurement device comprises an X-ray reflectometer.

5152. The method of claim 5140, wherein the first measurement device comprises a grazing X-ray reflectometer.

5153. The method of claim 5140, wherein the first measurement device comprises an X-ray diffractometer.

5154. The method of claim 5140, wherein the first measurement device comprises at least two measurement devices, and wherein the at least two measurement devices are selected from the group consisting of a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a beam profile ellipsometer, a photo-acoustic

device, an eddy current device, an X-ray reflectometer, a grazing X-ray reflectometer, and an X-ray diffractometer.

5155. The method of claim 5140, wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

5156. The method of claim 5140, wherein generating the one or more output signals responsive to the at least one electrical property of the specimen with the second measurement device comprises:

annealing the specimen;

reducing a temperature of the specimen subsequent to the annealing;

depositing a charge on an upper surface of the specimen; and

measuring the at least one electrical property of the charged upper surface of the specimen.

5157. The method of claim 5140, wherein the at least one electrical property of the specimen is selected from the group consisting of a capacitance, a dielectric constant, and a resistivity.

5158. The method of claim 5140, wherein the at least one electrical property comprises at least one electrical property of a layer formed on the specimen, and wherein the layer comprises a dielectric material.

5159. The method of claim 5140, further comprising processing the one or more output signals of the second measurement device to determine a characteristic of metal contamination on the specimen.

5160. The method of claim 5140, further comprising processing the one or more output signals of the first or second measurement device to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5161. The method of claim 5140, further comprising processing the one or more output signals of the first measurement device and the one or more output signals of the second measurement device substantially simultaneously to determine the at least one thin film characteristic and the at least one electrical property substantially simultaneously.

5162. The method of claim 5140, further comprising generating the one or more output signals responsive to the at least one thin film characteristic of the specimen with the first measurement device at multiple locations on the specimen substantially simultaneously and processing the one or more output signals from the first measurement device to determine the at least one thin film characteristic at the multiple locations on the specimen.

5163. The method of claim 5140, further comprising generating the one or more output signals responsive to the at least one electrical property of the specimen with the second measurement device at multiple locations on the specimen substantially simultaneously and processing the one or more output signals from the second measurement device to determine the at least one electrical property at the multiple locations on the specimen.

5164. The method of claim 5140, wherein the stage and the first and second measurement devices are coupled to a process tool.

5165. The method of claim 5140, wherein the stage and the first and second measurement devices are coupled to a process tool, and wherein the stage and the first and second measurement devices are arranged laterally proximate to the process tool.

5166. The method of claim 5140, wherein the stage and the first and second measurement devices are coupled to a process tool, and wherein the stage and the first and second measurement devices are disposed within the process tool.

5167. The method of claim 5140, wherein the stage and the first and second measurement devices are coupled to a process tool selected from the group consisting of a chemical vapor deposition tool, an atomic layer deposition tool, a physical vapor deposition tool, a plating tool, a chemical-mechanical polishing tool, a thermal tool, a cleaning tool, an ion implanter, and an etch tool.

5168. The method of claim 5140, wherein the stage and the first and second measurement devices are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

5169. The method of claim 5140, wherein the stage and the first and second measurement devices are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to determining the at least two properties of the specimen using the stage.

5170. The method of claim 5140, wherein the stage and the first and second measurement devices are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

5171. The method of claim 5140, wherein the stage and the first and second measurement devices are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

5172. The method of claim 5140, wherein the stage and the first and second measurement devices are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

5173. The method of claim 5140, wherein the stage and the first and second measurement devices are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

5174. The method of claim 5140, wherein the stage and the first and second measurement devices are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

5175. The method of claim 5140, wherein the stage and the first and second measurement devices are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

5176. The method of claim 5140, wherein the stage and the first and second measurement devices are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

5177. The method of claim 5140, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

5178. The method of claim 5177, further comprising determining one or more of the at least two properties of the specimen during the process step.

5179. The method of claim 5178, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

5180. The method of claim 5178, further comprising altering a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties using an in situ control technique.

5181. The method of claim 5140, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

5182. The method of claim 5181, further comprising determining one or more of the at least two properties during said moving the specimen from the first process chamber to the second process chamber.

5183. The method of claim 5140, further comprising comparing one or more of the at least two properties of the specimen and properties of a plurality of specimens.

5184. The method of claim 5140, further comprising comparing one or more of the at least two properties of the specimen to a predetermined range for the one or more properties.

5185. The method of claim 5184, further comprising generating an output signal if one or more of the at least two properties of the specimen is outside of the predetermined range for the property.

5186. The method of claim 5140, further comprising altering a sampling frequency of the first measurement device in response to the at least one thin film characteristic of the specimen.

5187. The method of claim 5140, further comprising altering a sampling frequency of the second measurement device in response to the at least one electrical property of the specimen.

5188. The method of claim 5140, further comprising altering a parameter of one or more instruments coupled to the first measurement device in response to the at least one thin film characteristic of the specimen using a feedback control technique.

5189. The method of claim 5140, further comprising altering a parameter of one or more instruments coupled to the second measurement device in response to the at least one electrical property of the specimen using a feedback control technique.

5190. The method of claim 5140, further comprising altering a parameter of one or more instruments coupled to the first measurement device in response to the at least one thin film characteristic of the specimen using a feedforward control technique.

5191. The method of claim 5140, further comprising altering a parameter of one or more instruments coupled to the second measurement device in response to the at least one electrical property of the specimen using a feedforward control technique.

5192. The method of claim 5140, further comprising generating a database, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, the method further comprising calibrating the first and second measurement devices using the database.

5193. The method of claim 5140, further comprising generating a database, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, the method further comprising monitoring output signals of the first and second measurement devices using the database.

5194. The method of claim 5140, further comprising generating a database, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, and wherein the database further comprises the at least one thin film characteristic and the at least one electrical property of a plurality of specimens.

5195. The method of claim 5194, wherein the at least one thin film characteristic and the at least one electrical property of the plurality of specimens are determined using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

5196. The method of claim 5194, wherein the at least one thin film characteristic and the at least one electrical property of the plurality of specimens are determined using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

5197. The method of claim 5140, wherein a stand alone system is coupled to the first and second measurement devices, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the first and second measurement devices with the stand alone system.

5198. The method of claim 5140, wherein a stand alone system is coupled to the first and second measurement devices and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the first and second measurement devices an at least the one additional measurement device with the stand alone system.

5199. The method of claim 5140, further comprising determining the at least one thin film characteristic of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to the at least one thin film characteristic of the specimen at the more than one position on the specimen to reduce within wafer variation of the at least one thin film characteristic.

5200. The method of claim 5140, further comprising determining the at least one electrical property of the specimen at more than one position of the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to the at least one electrical property of the specimen at the more than one position on the specimen to reduce within wafer variation of the at least one electrical property.

5201. The method of claim 5140, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedback control technique.

5202. The method of claim 5140, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedforward control technique.

5203. The method of claim 5140, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

5204. The method of claim 5203, further comprising determining a relationship between one or more of the at least two properties and at least one of the monitored parameters.

5205. The method of claim 5204, further comprising altering a parameter of at least one of the instruments in response to the relationship.

5206. The method of claim 5140, wherein processing the one or more output signals from the first measurement device and processing the one or more output signals from the second measurement device comprises:

at least partially processing the one or more output signals from the first and second measurement devices using a local processor, wherein the local processor is coupled to the first and second measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

5207. The method of claim 5206, wherein at least partially processing the one or more output signals comprises determining the at least one thin film characteristic and the at least one electrical property of the specimen.

5208. The method of claim 5206, wherein further processing the partially processed one or more output signals comprises determining the at least one thin film characteristic and the at least one electrical property of the specimen.

5209. A computer-implemented method for controlling a system configured to determine at least two properties of a specimen during use, wherein the system comprises a stage configured to support the specimen, and wherein the stage is coupled to a first measurement device and a second measurement device, comprising:

controlling the first measurement device to generate one or more output signals responsive to at least one thin film characteristic of the specimen;

controlling the second measurement device to generate one or more output signals responsive to at least electrical property of the specimen;

processing the one or more output signals from the first measurement device to determine the at least one thin film characteristic of the specimen; and

processing the one or more output signals from the second measurement device to determine the at least one electrical property of the specimen.

5210. The method of claim 5209, further comprising controlling the stage to laterally move the stage while determining the at least two properties of the specimen.

5211. The method of claim 5209, further comprising controlling the stage to rotatably move the stage while determining the at least two properties of the specimen.

5212. The method of claim 5209, further comprising controlling the stage to laterally and rotatably move the stage while determining the at least two properties of the specimen.

5213. The method of claim 5209, wherein the first measurement device comprises a reflectometer.

5214. The method of claim 5209, wherein the first measurement device comprises a spectroscopic reflectometer.

5215. The method of claim 5209, wherein the first measurement device comprises an ellipsometer.

5216. The method of claim 5209, wherein the first measurement device comprises a spectroscopic ellipsometer.

5217. The method of claim 5209, wherein the first measurement device comprises a beam profile ellipsometer.

5218. The method of claim 5209, wherein the first measurement device comprises a photo-acoustic device.

5219. The method of claim 5209, wherein the first measurement device comprises an eddy current device.

5220. The method of claim 5209, wherein the first measurement device comprises an X-ray reflectometer.

5221. The method of claim 5209, wherein the first measurement device comprises a grazing X-ray reflectometer.

5222. The method of claim 5209, wherein the first measurement device comprises an X-ray diffractometer.

5223. The method of claim 5209, wherein the first measurement device comprises at least two measurement devices, and wherein the at least two measurement devices are selected from the group consisting of a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a beam profile ellipsometer, a photo-acoustic device, an eddy current device, an X-ray reflectometer, a grazing X-ray reflectometer, and an X-ray diffractometer.

5224. The method of claim 5209, wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

5225. The method of claim 5209, wherein controlling the second measurement device to generate one or more output signals responsive to the at least one electrical property of the specimen comprises controlling the second measurement device to:

anneal the specimen;

reduce a temperature of the specimen subsequent to the annealing;

deposit a charge on an upper surface of the specimen; and

measure the at least one electrical property of the charged upper surface of the specimen.

5226. The method of claim 5209, wherein the at least one electrical property of the specimen is selected from the group consisting of a capacitance, a dielectric constant, and a resistivity.

5227. The method of claim 5209, wherein the at least one electrical property comprises at least one electrical property of a layer formed on the specimen, and wherein the layer comprises a dielectric material.

5228. The method of claim 5209, further comprising processing the one or more output signals of the second measurement device to determine a characteristic of metal contamination on the specimen.

5229. The method of claim 5209, further comprising processing the one or more output signals of the first or second measurement device to determine a third property of the

specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5230. The method of claim 5209, further comprising processing the one or more output signals of the first measurement device and the one or more output signals of the second measurement device substantially simultaneously to determine the at least one thin film characteristic and the at least one electrical property substantially simultaneously.

5231. The method of claim 5209, further comprising controlling the first measurement device to generate one or more output signals responsive to the at least one thin film characteristic of the specimen at multiple locations of the specimen substantially simultaneously and processing the one or more output signals from the first measurement device to determine the at least one thin film characteristic at the multiple locations on the specimen.

5232. The method of claim 5209, further comprising controlling the second measurement device to generate one or more output signals responsive to the at least one electrical property of the specimen at the multiple locations of the specimen substantially simultaneously and processing the one or more output signals from the second measurement device to determine the at least one electrical property at the multiple locations on the specimen.

5233. The method of claim 5209, wherein the stage and the first and second measurement devices are coupled to a process tool.

5234. The method of claim 5209, wherein the stage and the first and second measurement devices are coupled to a process tool, and wherein the stage and the first and second measurement devices are arranged laterally proximate to the process tool.

5235. The method of claim 5209, wherein the stage and the first and second measurement devices are coupled to a process tool, and wherein the stage and the first and second measurement devices are disposed within the process tool.

5236. The method of claim 5209, wherein the stage and the first and second measurement devices are coupled to a process tool selected from the group consisting of a chemical vapor deposition tool, an atomic layer deposition tool, a physical vapor deposition tool, a plating tool, a chemical-mechanical polishing tool, a thermal tool, a cleaning tool, an ion implanter, and an etch tool.

5237. The method of claim 5209, wherein the stage and the first and second measurement devices are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage, and wherein the wafer handler is coupled to the process tool.

5238. The method of claim 5209, wherein the stage and the first and second measurement devices are coupled to a process tool, the method further comprising controlling the stage to move the specimen from the system to the process tool.

5239. The method of claim 5209, wherein the stage and the first and second measurement devices are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage such that the at least two properties of the specimen can be determined while the specimen is waiting between process steps.

5240. The method of claim 5209, wherein the stage and the first and second measurement devices are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

5241. The method of claim 5209, wherein the stage and the first and second measurement devices are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

5242. The method of claim 5209, wherein the stage and the first and second measurement devices are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

5243. The method of claim 5209, wherein the stage and the first and second measurement devices are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

5244. The method of claim 5209, wherein the stage and the first and second measurement devices are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

5245. The method of claim 5209, wherein the stage and the first and second measurement devices are disposed within a measurement chamber, and wherein the

measurement chamber is arranged vertically proximate to a process chamber of a process tool.

5246. The method of claim 5209, further comprising disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

5247. The method of claim 5209, further comprising controlling at least one of the first and second measurement devices during the process step.

5248. The method of claim 5247, further comprising controlling the system to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

5249. The method of claim 5247, further comprising controlling the system to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties using an in situ control technique.

5250. The method of claim 5209, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

5251. The method of claim 5250, further comprising controlling at least one of the first measurement and the second devices during said moving the specimen from the first process chamber to the second process chamber.

5252. The method of claim 5209, further comprising comparing one or more of the at least two properties of the specimen and properties of a plurality of specimens.

5253. The method of claim 5209, further comprising comparing one or more of the at least two properties of the specimen to a predetermined range for the one or more properties.

5254. The method of claim 5253, further comprising generating an output signal if one or more of the at least two properties of the specimen is outside of the predetermined range for the property.

5255. The method of claim 5209, further comprising altering a sampling frequency of the first measurement device in response to the at least one thin film characteristic of the specimen.

5256. The method of claim 5209, further comprising altering a sampling frequency of the second measurement device in response to the at least one electrical property of the specimen.

5257. The method of claim 5209, further comprising altering a parameter of one or more instruments coupled to the first measurement device in response to the at least one thin film characteristic using a feedback control technique.

5258. The method of claim 5209, further comprising altering a parameter of one or more instruments coupled to the second measurement device in response to the at least one electrical property using a feedback control technique.

5259. The method of claim 5209, further comprising altering a parameter of one or more instruments coupled to the first measurement device in response to the at least one thin film characteristic using a feedforward control technique.

5260. The method of claim 5209, further comprising altering a parameter of one or more instruments coupled to the second measurement device in response to the at least one electrical property using a feedforward control technique.

5261. The method of claim 5209, further comprising generating a database, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, the method further comprising calibrating the first and second measurement devices using the database.

5262. The method of claim 5209, further comprising generating a database, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, the method further comprising monitoring output signals of the first and second measurement device using the database.

5263. The method of claim 5209, further comprising generating a database, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, and wherein the database further comprises the at least one thin film characteristic and the at least one electrical property of a plurality of specimens.

5264. The method of claim 5263, wherein the at least one thin film characteristic and the at least one electrical property of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

5265. The method of claim 5263, wherein the at least one thin film characteristic and the at least one electrical property of the plurality of specimens are generated using a plurality

of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

5266. The method of claim 5209, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

5267. The method of claim 5209, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

5268. The method of claim 5209, further comprising controlling the first measurement device to generate one or more signals responsive the at least one thin film characteristic of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to the at least one thin film characteristic of the specimen at the more than one position on the specimen to reduce within wafer variation of the at least one thin film characteristic.

5269. The method of claim 5209, further comprising controlling the second measurement device to generate one or more signals responsive the at least one electrical property of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to the at least

one electrical property of the specimen at the more than one position on the specimen to reduce within wafer variation of the at least one electrical property.

5270. The method of claim 5209, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedback control technique.

5271. The method of claim 5209, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedforward control technique.

5272. The method of claim 5209, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

5273. The method of claim 5272, further comprising determining a relationship between one or more of the at least two properties and at least one of the monitored parameters.

5274. The method of claim 5273, further comprising altering a parameter of at least one of the instruments in response to the relationship.

5275. The method of claim 5209, wherein processing the one or more output signals from the first measurement device and processing the one or more output signals from the second measurement device comprises:

at least partially processing the one or more output signals from the first and second measurement devices using a local processor, wherein the local processor is coupled to the first and second measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

5276. The method of claim 5275, wherein at least partially processing the one or more output signals comprises determining the at least one thin film characteristic and the at least one electrical property of the specimen.

5277. The method of claim 5275, wherein further processing the partially processed one or more output signals comprises determining the at least one thin film characteristic and the at least one electrical property of the specimen.

5278. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a first measurement device and a second measurement device;

generating one or more output signals responsive to at least one thin film characteristic of the specimen with the first measurement device;

generating one or more output signals responsive to at least one electrical property of the specimen with the second measurement device;

processing the one or more output signals from the first measurement device to determine the at least one thin film characteristic of the specimen; and

processing the one or more output signals from the second measurement device to determine the at least one electrical property of the specimen.

5279. The device of claim 5278, wherein the first measurement device comprises a reflectometer.

5280. The device of claim 5278, wherein the first measurement device comprises a spectroscopic reflectometer.

5281. The device of claim 5278, wherein the first measurement device comprises an ellipsometer.

5282. The device of claim 5278, wherein the first measurement device comprises a spectroscopic ellipsometer.

5283. The device of claim 5278, wherein the first measurement device comprises a beam profile ellipsometer.

5284. The device of claim 5278, wherein the first measurement device comprises a photo-acoustic device.

5285. The device of claim 5278, wherein the first measurement device comprises an eddy current device.

5286. The device of claim 5278, wherein the first measurement device comprises an X-ray reflectometer.

5287. The device of claim 5278, wherein the first measurement device comprises a grazing X-ray reflectometer.

5288. The device of claim 5278, wherein the first measurement device comprises an X-ray diffractometer.

5289. The device of claim 5278, wherein the first measurement device comprises at least two measurement devices, and wherein the at least two measurement devices are selected from the group consisting of a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a beam profile ellipsometer, a photo-acoustic device, an eddy current device, an X-ray reflectometer, a grazing X-ray reflectometer, and an X-ray diffractometer.

5290. The device of claim 5278, wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

5291. The device of claim 5278, wherein generating the one or more output signals responsive to the at least one electrical property of the specimen with the second measurement device comprises:

annealing the specimen;

reducing a temperature of the specimen subsequent to the annealing;

depositing a charge on an upper surface of the specimen; and

measuring the at least one electrical property of the charged upper surface of the specimen.

5292. The device of claim 5278, wherein the at least one electrical property of the specimen is selected from the group consisting of a capacitance, a dielectric constant, and a resistivity.

5293. The device of claim 5278, wherein the at least one electrical property comprises at least one electrical property of a layer formed on the specimen, and wherein the layer comprises a dielectric material.

5294. The device of claim 5278, further comprising processing the one or more output signals of the second measurement device to determine a characteristic of metal contamination on the specimen.

5295. The device of claim 5278, further comprising processing the one or more output signals of the first or second measurement device to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5296. The device of claim 5278, further comprising processing the one or more output signals of the first measurement device and the one or more output signals of the second measurement device substantially simultaneously to determine the at least one thin film characteristic and the at least one electrical property substantially simultaneously.

5297. The device of claim 5278, further comprising generating the one or more output signals responsive to the at least one thin film characteristic of the specimen with the first measurement device at multiple locations on the specimen substantially simultaneously and processing the one or more output signals from the first measurement device to determine the at least one thin film characteristic at the multiple locations on the specimen.

5298. The device of claim 5278, further comprising generating the one or more output signals responsive to the at least one electrical property of the specimen with the second measurement device at multiple locations on the specimen substantially simultaneously and processing the one or more output signals from the second measurement device to determine the at least one electrical property at the multiple locations on the specimen.

5299. The device of claim 5278, wherein the stage and the first and second measurement devices are coupled to a process tool.

5300. The device of claim 5278, wherein the stage and the first and second measurement devices are coupled to a process tool selected from the group consisting of a chemical vapor deposition tool, an atomic layer deposition tool, a physical vapor deposition tool, a plating tool, a chemical-mechanical polishing tool, a thermal tool, a cleaning tool, an ion implanter, and an etch tool.

5301. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a first measurement device and a second measurement device;

generating one or more output signals responsive to at least one thin film characteristic of the specimen with the first measurement device;

generating one or more output signals responsive to at least one electrical property of the specimen with the second measurement device;

processing the one or more output signals from the first measurement device to determine the at least one thin film characteristic of the specimen; and

processing the one or more output signals from the second measurement device to determine the at least one electrical property of the specimen.

5302. The method of claim 5301, wherein the first measurement device comprises a reflectometer.

5303. The method of claim 5301, wherein the first measurement device comprises a spectroscopic reflectometer.

5304. The method of claim 5301, wherein the first measurement device comprises an ellipsometer.

5305. The method of claim 5301, wherein the first measurement device comprises a spectroscopic ellipsometer.

5306. The method of claim 5301, wherein the first measurement device comprises a beam profile ellipsometer.

5307. The method of claim 5301, wherein the first measurement device comprises a photo-acoustic device.

5308. The method of claim 5301, wherein the first measurement device comprises an eddy current device.

5309. The method of claim 5301, wherein the first measurement device comprises an X-ray reflectometer.

5310. The method of claim 5301, wherein the first measurement device comprises a grazing X-ray reflectometer.

5311. The method of claim 5301, wherein the first measurement device comprises an X-ray diffractometer.

5312. The method of claim 5301, wherein the first measurement device comprises at least two measurement devices, and wherein the at least two measurement devices are selected from the group consisting of a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a beam profile ellipsometer, a photo-acoustic device, an eddy current device, an X-ray reflectometer, a grazing X-ray reflectometer, and an X-ray diffractometer.

5313. The method of claim 5301, wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

5314. The method of claim 5301, wherein generating the one or more output signals responsive to the at least one electrical property of the specimen with the second measurement device comprises:

annealing the specimen;

reducing a temperature of the specimen subsequent to the annealing;

depositing a charge on an upper surface of the specimen; and

measuring the at least one electrical property of the charged upper surface of the specimen.

5315. The method of claim 5301, wherein the at least one electrical property of the specimen is selected from the group consisting of a capacitance, a dielectric constant, and a resistivity.

5316. The method of claim 5301, wherein the at least one electrical property comprises at least one electrical property of a layer formed on the specimen, and wherein the layer comprises a dielectric material.

5317. The method of claim 5301, further comprising processing the one or more output signals of the second measurement device to determine a characteristic of metal contamination on the specimen.

5318. The method of claim 5301, further comprising processing the one or more output signals of the first or second measurement device to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5319. The method of claim 5301, further comprising processing the one or more output signals of the first measurement device and the one or more output signals of the second measurement device substantially simultaneously to determine the at least one thin film characteristic and the at least one electrical property substantially simultaneously.

5320. The method of claim 5301, further comprising generating the one or more output signals responsive to the at least one thin film characteristic of the specimen with the first measurement device at multiple locations on the specimen substantially simultaneously and processing the one or more output signals from the first measurement device to determine the at least one thin film characteristic at the multiple locations on the specimen.

5321. The method of claim 5301, further comprising generating the one or more output signals responsive to the at least one electrical property of the specimen with the second measurement device at multiple locations on the specimen substantially simultaneously and processing the one or more output signals from the second measurement device to determine the at least one electrical property at the multiple locations on the specimen.

5322. The method of claim 5301, wherein the stage and the first and second measurement devices are coupled to a process tool.

5323. The method of claim 5301, wherein the stage and the first and second measurement devices are coupled to a process tool selected from the group consisting of a chemical vapor deposition tool, an atomic layer deposition tool, a physical vapor deposition tool, a plating tool, a chemical-mechanical polishing tool, a thermal tool, a cleaning tool, an ion implanter, and an etch tool.

5324. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a first measurement device coupled to the stage, wherein the first measurement device is configured to generate one or more output signals responsive to at least one thin film characteristic of the specimen during use;

a second measurement device coupled to the stage, wherein the second measurement device is configured to generate one or more output signals responsive to at least one electrical property during use;

a local processor coupled to the first and second measurement devices, wherein the local processor is configured to at least partially process the one or more output signals from the first measurement device and the one or more output signals from the second measurement device during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals, to determine the at least one thin film characteristic from the at least partially processed output signals of the first measurement device, and to determine the at least one electrical property of the specimen from the at least partially processed output signals of the second measurement device during use.

5325. The system of claim 5324, wherein the first measurement device comprises a reflectometer.

5326. The system of claim 5324, wherein the first measurement device comprises a spectroscopic reflectometer.

5327. The system of claim 5324, wherein the first measurement device comprises an ellipsometer.

5328. The system of claim 5324, wherein the first measurement device comprises a spectroscopic ellipsometer.

5329. The system of claim 5324, wherein the first measurement device comprises a beam profile ellipsometer.

5330. The system of claim 5324, wherein the first measurement device comprises a photo-acoustic device.

5331. The system of claim 5324, wherein the first measurement device comprises an eddy current device.

5332. The system of claim 5324, wherein the first measurement device comprises an X-ray reflectometer.

5333. The system of claim 5324, wherein the first measurement device comprises a grazing X-ray reflectometer.

5334. The system of claim 5324, wherein the first measurement device comprises an X-ray diffractometer.

5335. The system of claim 5324, wherein the first measurement device comprises at least two measurement devices, and wherein the two measurement devices are selected from the group consisting of a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a beam profile ellipsometer, a photo-acoustic device, an eddy current device, an X-ray reflectometer, a grazing X-ray reflectometer, and an X-ray diffractometer.

5336. The system of claim 5324, wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

5337. The system of claim 5324, wherein the second measurement device comprises:

an oven configured to anneal the specimen;

a cooling device configured to reduce a temperature of the specimen subsequent to an annealing process;

a device configured to deposit a charge on an upper surface of the specimen; and

a sensor configured to measure the at least one electrical property of the charged upper surface of the specimen.

5338. The system of claim 5324, wherein the at least one electrical property of the specimen is selected from the group consisting of a capacitance, a dielectric constant, and a resistivity.

5339. The system of claim 5324, wherein the at least one electrical property comprises at least one electrical property of a layer on the specimen, and wherein the layer comprises a dielectric material.

5340. The system of claim 5324, wherein the remote controller computer is further configured to determine a characteristic of metal contamination on the specimen from the at least partially processed one or more output signals of the second measurement device during use.

5341. The system of claim 5324, wherein the remote controller computer is further configured to determine a third property of the specimen from the at least partially processed one or more output signals of the first or second measurement device during use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5342. The system of claim 5324, wherein the remote controller computer is further coupled to a process tool.

5343. The system of claim 5324, wherein the remote controller computer is further coupled to a process tool selected from a group consisting of a chemical vapor deposition tool, an atomic layer deposition tool, a physical vapor deposition tool, a plating tool, a chemical-mechanical polishing tool, a thermal tool, a cleaning tool, an ion implanter, and an etch tool.

5344. The system of claim 5324, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in

response to one or more of the at least two properties using a feedback control technique during use.

5345. The system of claim 5324, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties using a feedforward control technique during use.

5346. The system of claim 5324, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

5347. The system of claim 5346, wherein the remote controller computer is further configured to determine a relationship between one or more of the at least two properties of the specimen and at least one of the monitored parameters during use.

5348. The system of claim 5347, wherein the remote controller computer is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

5349. The system of claim 5324, wherein the system is further configured to determine one or more of the at least two properties of the specimen during the process step.

5350. The system of claim 5349, wherein the remote controller computer is further configured to obtain a signature characterizing the process step during use, and wherein

the signature comprises at least one singularity representative of an end of the process step.

5351. The system of claim 5349, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties using an in situ control technique during use.

5352. The system of claim 5324, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

5353. The system of claim 5352, wherein the system is further configured to determine one or more of the at least two properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

5354. The system of claim 5324, wherein the remote controller computer is further configured to compare one or more of the at least two properties of the specimen and properties of a plurality of specimens during use.

5355. The system of claim 5324, wherein the remote controller computer is further configured to compare one or more of the at least two properties of the specimen to a predetermined range for the one or more properties during use.

5356. The system of claim 5355, wherein the remote controller computer is further configured to generate an output signal if one or more of the at least two properties of the specimen are outside of the predetermined range for the property during use.

5357. The system of claim 5324, wherein the remote controller computer is further configured to alter a sampling frequency of the first measurement device in response to the at least one thin film characteristic of the specimen during use.

5358. The system of claim 5324, wherein the remote controller computer is further configured to alter a sampling frequency of the second measurement device in response to the at least one electrical property of the specimen during use.

5359. The system of claim 5324, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the first measurement device in response to the at least one thin film characteristic of the specimen using a feedback control technique during use.

5360. The system of claim 5324, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the second measurement device in response to the at least one electrical property of the specimen using a feedback control technique during use.

5361. The system of claim 5324, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the first measurement device in response to the at least one thin film characteristic using a feedforward control technique during use.

5362. The system of claim 5324, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the second measurement device in response to the at least one electrical property using a feedforward control technique during use.

5363. The system of claim 5324, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, and wherein the remote controller computer is further configured to calibrate the first and second measurement devices using the database during use.

5364. The system of claim 5324, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, and wherein the remote controller computer is further configured to monitor output signals generated by first and second measurement devices using the database during use.

5365. The system of claim 5324, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, and wherein the database further comprises the at least one thin film characteristic and the at least one electrical property of a plurality of specimens.

5366. The system of claim 5365, wherein the at least one thin film characteristic and the at least one electrical property of the plurality of specimens are determined using a plurality of measurement devices, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

5367. The system of claim 5365, wherein the at least one thin film characteristic and the at least one electrical property of the plurality of specimens are determined using a plurality of measurement devices, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

5368. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a first measurement device and a second measurement device;

generating one or more output signals responsive to at least one thin film characteristic of the specimen with the first measurement device;

generating one or more output signals responsive to at least one electrical property of the specimen with the second measurement device;

processing the one or more output signals from the first measurement device to determine the at least one thin film characteristic of the specimen and the one or more output signals from the second measurement device to determine the at least one electrical property of the specimen, comprising:

at least partially processing the one or more output signals from the first measurement device and the one or more output signals from the second measurement device using a local processor, wherein the local processor is coupled to the first and second measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

5369. The method of claim 5368, wherein the first measurement device comprises a reflectometer.

5370. The method of claim 5368, wherein the first measurement device comprises a spectroscopic reflectometer.

5371. The method of claim 5368, wherein the first measurement device comprises an ellipsometer.

5372. The method of claim 5368, wherein the first measurement device comprises a spectroscopic ellipsometer.

5373. The method of claim 5368, wherein the first measurement device comprises a beam profile ellipsometer.

5374. The method of claim 5368, wherein the first measurement device comprises a photo-acoustic device.

5375. The method of claim 5368, wherein the first measurement device comprises an eddy current device.

5376. The method of claim 5368, wherein the first measurement device comprises an X-ray reflectometer.

5377. The method of claim 5368, wherein the first measurement device comprises a grazing X-ray reflectometer.

5378. The method of claim 5368, wherein the first measurement device comprises an X-ray diffractometer.

5379. The method of claim 5368, wherein the first measurement device comprises at least two measurement devices, and wherein the at least two measurement devices are selected from the group consisting of a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a beam profile ellipsometer, a photo-acoustic device, an eddy current device, an X-ray reflectometer, a grazing X-ray reflectometer, and an X-ray diffractometer.

5380. The method of claim 5368, wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

5381. The method of claim 5368, wherein generating the one or more output signals responsive to the at least one electrical property of the specimen with the second measurement device comprises:

annealing the specimen;

reducing a temperature of the specimen subsequent to the annealing;

depositing a charge on an upper surface of the specimen; and

measuring the at least one electrical property of the charged upper surface of the specimen.

5382. The method of claim 5368, wherein the at least one electrical property of the specimen is selected from the group consisting of a capacitance, a dielectric constant, and a resistivity.

5383. The method of claim 5368, wherein the at least one electrical property comprises at least one electrical property of a layer formed on the specimen, and wherein the layer comprises a dielectric material.

5384. The method of claim 5368, further comprising processing the one or more output signals of the second measurement device to determine a characteristic of metal contamination on the specimen.

5385. The method of claim 5368, further comprising processing the one or more output signals of the first or second measurement device to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5386. The method of claim 5368, further comprising processing the one or more output signals of the first measurement device and the one or more output signals of the second measurement device substantially simultaneously to determine the at least one thin film characteristic and the at least one electrical property substantially simultaneously.

5387. The method of claim 5368, further comprising generating the one or more output signals responsive to the at least one thin film characteristic of the specimen with the first measurement device at multiple locations on the specimen substantially simultaneously and processing the one or more output signals from the first measurement device to determine the at least one thin film characteristic at the multiple locations on the specimen.

5388. The method of claim 5368, further comprising generating the one or more output signals responsive to the at least one electrical property of the specimen with the second measurement device at multiple locations on the specimen substantially simultaneously and processing the one or more output signals from the second measurement device to determine the at least one electrical property at the multiple locations on the specimen.

5389. The method of claim 5368, wherein the remote controller computer is coupled to a process tool.

5390. The method of claim 5368, wherein the remote controller computer is coupled to a process tool selected from the group consisting of a chemical vapor deposition tool, an atomic layer deposition tool, a physical vapor deposition tool, a plating tool, a chemical-mechanical polishing tool, a thermal tool, a cleaning tool, an ion implanter, and an etch tool.

5391. The method of claim 5368, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedback control technique.

5392. The method of claim 5368, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedforward control technique.

5393. The method of claim 5368, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

5394. The method of claim 5393, further comprising determining a relationship between one or more of the at least two properties and at least one of the monitored parameters.

5395. The method of claim 5394, further comprising altering a parameter of at least one of the instruments in response to the relationship.

5396. The method of claim 5368, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

5397. The method of claim 5396, further comprising determining one or more of the at least two properties of the specimen during the process step.

5398. The method of claim 5397, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

5399. The method of claim 5397, further comprising altering a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties using an in situ control technique.

5400. The method of claim 5368, further comprising moving the specimen from a first process chamber to a second process chamber using the stage and determining one or more of the at least two properties of the specimen during said moving the specimen from the first process chamber to the second process chamber.

5401. The method of claim 5368, further comprising comparing one or more of the at least two properties of the specimen and properties of a plurality of specimens.

5402. The method of claim 5368, further comprising comparing one or more of the at least two properties of the specimen to a predetermined range for the one or more properties.

5403. The method of claim 5402, further comprising generating an output signal if one or more of the at least twp properties of the specimen is outside of the predetermined range for the property.

5404. The method of claim 5368, further comprising altering a sampling frequency of the first measurement device in response to the at least one thin film characteristic of the specimen.

5405. The method of claim 5368, further comprising altering a sampling frequency of the second measurement device in response to the at least one electrical property of the specimen.

5406. The method of claim 5368, further comprising altering a parameter of one or more instruments coupled to the first measurement device in response to the at least one thin film characteristic of the specimen using a feedback control technique.

5407. The method of claim 5368, further comprising altering a parameter of one or more instruments coupled to the second measurement device in response to the at least one electrical property of the specimen using a feedback control technique.

5408. The method of claim 5368, further comprising altering a parameter of one or more instruments coupled to the first measurement device in response to the at least one thin film characteristic of the specimen using a feedforward control technique.

5409. The method of claim 5368, further comprising altering a parameter of one or more instruments coupled to the second measurement device in response to the at least one electrical property of the specimen using a feedforward control technique.

5410. The method of claim 5368, further comprising generating a database using the remote controller computer, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, the method further comprising calibrating the measurement device using the remote controller computer and the database.

5411. The method of claim 5368, further comprising generating a database using the remote controller computer, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, the method further comprising monitoring output signals of the first and second measurement devices using the remote controller computer and the database.

5412. The method of claim 5368, further comprising generating a database using the remote controller computer, wherein the database comprises the at least one thin film characteristic of the specimen and the at least one electrical property of the specimen, and

wherein the database further comprises the at least one thin film characteristic and the at least one electrical property of a plurality of specimens.

5413. The method of claim 5412, wherein the at least one thin film characteristic and the at least one electrical property of a plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the remote controller computer and the database.

5414. The method of claim 5412, wherein the at least one thin film characteristic and the at least one electrical property of a plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the remote controller computer and the database.

5415. The method of claim 5368, further comprising sending the at least partially processed one or more output signals from a plurality of local processors to the remote controller computer, wherein at least one of the plurality of local processors is coupled to one of a plurality of measurement devices.

5416. The method of claim 5415, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices using the remote controller computer in response to one or more of the at least two properties of the specimen.

5417. The method of claim 5415, wherein at least one of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

5418. The method of claim 5417, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of process tools using the remote

controller computer in response to one or more of the at least two properties of the specimen.

5419. A system configured to determine at least four properties of a specimen during use, comprising:

a plurality of measurement devices, wherein the plurality of measurement devices are configured to generate one or more output signals responsive to a critical dimension of the specimen, overlay misregistration of the specimen, a presence of defects on the specimen, and a thin film characteristic of the specimen during use; and

a processor coupled to the plurality of measurement devices, wherein the processor is configured to determine the at least four properties of the specimen from the one or more output signals during use, and wherein the at least four properties comprise the critical dimension of the specimen, the overlay misregistration of the specimen, the presence of defects on the specimen, and the thin film characteristic of the specimen.

5420. The system of claim 5419, wherein the system is further configured as a cluster tool.

5421. The system of claim 5419, wherein the system is further configured as a stand alone system.

5422. The system of claim 5419, further comprising a stage configured to support the specimen during use, wherein the stage is coupled to at least one of the plurality of

measurement devices, and wherein the stage is further configured to move laterally during use.

5423. The system of claim 5419, further comprising a stage configured to support the specimen during use, wherein the stage is coupled to at least one of the plurality of measurement devices, and wherein the stage is further configured to move rotatably during use.

5424. The system of claim 5419, further comprising a stage configured to support the specimen during use, wherein the stage is coupled to at least one of the plurality of measurement devices, and wherein the stage is further configured to move laterally and rotatably during use.

5425. The system of claim 5419, wherein the plurality of measurement devices comprise a non-imaging scatterometer.

5426. The system of claim 5419, wherein the plurality of measurement devices comprise a scatterometer.

5427. The system of claim 5419, wherein the plurality of measurement devices comprise a spectroscopic scatterometer.

5428. The system of claim 5419, wherein the plurality of measurement devices comprise a reflectometer.

5429. The system of claim 5419, wherein the plurality of measurement devices comprise a spectroscopic reflectometer.

5430. The system of claim 5419, wherein the plurality of measurement devices comprise an ellipsometer.

5431. The system of claim 5419, wherein the plurality of measurement devices comprise a spectroscopic ellipsometer.

5432. The system of claim 5419, wherein the plurality of measurement devices comprise a beam profile ellipsometer.

5433. The system of claim 5419, wherein the plurality of measurement devices comprise a dual beam spectrophotometer.

5434. The system of claim 5419, wherein the plurality of measurement devices comprise a bright field imaging device.

5435. The system of claim 5419, wherein the plurality of measurement devices comprise a dark field imaging device.

5436. The system of claim 5419, wherein the plurality of measurement devices comprise a bright field and a dark field imaging device.

5437. The system of claim 5419, wherein the plurality of measurement devices comprise a double dark field device.

5438. The system of claim 5419, wherein the plurality of measurement devices comprise a bright field non-imaging device.

5439. The system of claim 5419, wherein the plurality of measurement devices comprise a dark field non-imaging device.

5440. The system of claim 5419, wherein the plurality of measurement devices comprise a bright field and a dark field non-imaging device.

5441. The system of claim 5419, wherein the plurality of measurement devices comprise a coherence probe microscope.

5442. The system of claim 5419, wherein the plurality of measurement devices comprise an interference microscope.

5443. The system of claim 5419, wherein the plurality of measurement devices comprise an optical profilometer.

5444. The system of claim 5419, wherein the plurality of measurement devices comprise a photo-acoustic device.

5445. The system of claim 5419, wherein the plurality of measurement devices comprise an eddy current device.

5446. The system of claim 5419, wherein the plurality of measurement devices comprise an X-ray reflectometer.

5447. The system of claim 5419, wherein the plurality of measurement devices comprise a grazing X-ray reflectometer.

5448. The system of claim 5419, wherein the plurality of measurement devices comprise an X-ray diffractometer.

5449. The system of claim 5419, wherein the plurality of measurement devices comprise at least a first measurement device and a second measurement device, and wherein elements of the first measurement device comprise elements of the second measurement device.

5450. The system of claim 5419, wherein the defects comprise macro defects.

5451. The system of claim 5419, wherein the presence of defects on the specimen comprises a presence of defects on a bottom surface of the specimen.

5452. The system of claim 5419, wherein the processor is further configured to determine a fifth property of the specimen from the one or more output signals during use, and wherein the fifth property comprises a flatness measurement of the specimen.

5453. The system of claim 5419, wherein the processor is further configured to determine a fifth property of the specimen from the one or more output signals during use, and wherein the fifth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5454. The system of claim 5419, wherein the system is further configured to determine at least four properties of the specimen substantially simultaneously during use.

5455. The system of claim 5419, wherein the plurality of measurement devices are further configured to generate one or more output signals responsive to one or more of the

at least four properties at multiple locations on the surface of the specimen substantially simultaneously during use such that the one or more properties can be determined at the multiple locations substantially simultaneously.

5456. The system of claim 5419, wherein the processor is further configured to compare one or more of the at least four properties of the specimen and properties of a plurality of specimens during use.

5457. The system of claim 5419, wherein the processor is further configured to compare one or more of the at least four properties of the specimen to a predetermined range for the one or more properties during use.

5458. The system of claim 5419, wherein the processor is further configured to compare one or more of the at least four properties of the specimen to a predetermined range for the one or more properties during use, and wherein the processor is further configured to generate an output signal if the one or more properties of the specimen are outside of the predetermined range during use.

5459. The system of claim 5419, wherein the processor is further configured to alter a sampling frequency of at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen during use.

5460. The system of claim 5419, wherein the processor is further configured to alter a parameter of one or more instruments coupled to at least one of the plurality of measurement devices in response to one or more of the at least four properties using a feedback control technique during use.

5461. The system of claim 5419, wherein the processor is further configured to alter a parameter of one or more instruments coupled to at least one of the plurality of measurement devices in response to one or more of the at least four properties using a feedforward control technique during use.

5462. The system of claim 5419, wherein the processor is further configured to generate a database during use, and wherein the database comprises the at least four properties of the specimen.

5463. The system of claim 5419, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least four properties of the specimen, and wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

5464. The system of claim 5419, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least four properties of the specimen, and wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

5465. The system of claim 5419, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least four properties of the specimen, wherein the database further comprises the at least four properties of a plurality of specimens, wherein the at least four properties of the plurality of specimens are determined using a plurality of systems, and wherein the processor is further configured to calibrate one or more measurement devices of the plurality of systems using the database during use.

5466. The system of claim 5419, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least four properties of the specimen, wherein the database further comprises the at least four properties of a plurality of specimens, wherein the at least four properties of the plurality of specimens are determined using a plurality of systems, and wherein the processor is further configured to monitor output signals generated by one or more measurement devices of the plurality of systems using the database during use.

5467. The system of claim 5419, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

5468. The system of claim 5419, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

5469. The system of claim 5419, wherein the system is further configured to determine at least the four properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen at the more than one position on the specimen to reduce within wafer variation of the one or more properties.

5470. The system of claim 5419, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more

instruments coupled to the process tool in response to one or more of the at least four properties using a feedback control technique during use.

5471. The system of claim 5419, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least four properties using a feedforward control technique during use.

5472. The system of claim 5419, wherein the processor comprises a local processor coupled to the plurality of measurement devices and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

5473. The system of claim 5472, wherein the local processor is further configured to determine the at least four properties of the specimen during use.

5474. The system of claim 5472, wherein the remote controller computer is further configured to determine the at least four properties of the specimen during use.

5475. A method for determining at least four properties of a specimen, comprising:

generating one or more output signals with a plurality of measurement devices, wherein the one or more output signals are responsive to at least four properties of the specimen; and

processing the one or more output signals to determine the at least four properties of the specimen, wherein the at least four properties comprise a critical dimension of the specimen, overlay misregistration of the specimen, a presence of defects on the specimen, and a thin film characteristic of the specimen.

5476. The method of claim 5475, wherein the plurality of measurement devices are configured as a cluster tool.

5477. The method of claim 5475, wherein the plurality of measurement devices are configured as a stand alone system.

5478. The method of claim 5475, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement devices, the method further comprising laterally moving the stage while determining the at least four properties of the specimen.

5479. The method of claim 5475, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement devices, the method further comprising rotatably moving the stage while determining the at least four properties of the specimen.

5480. The method of claim 5475, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement devices, the method further comprising laterally and rotatably moving the stage during while determining the at least four properties of the specimen.

5481. The method of claim 5475, wherein the plurality of measurement devices comprise a non-imaging scatterometer.

5482. The method of claim 5475, wherein the plurality of measurement devices comprise a scatterometer.

5483. The method of claim 5475, wherein the plurality of measurement devices comprise a spectroscopic scatterometer.

5484. The method of claim 5475, wherein the plurality of measurement devices comprise a reflectometer.

5485. The method of claim 5475, wherein the plurality of measurement devices comprise a spectroscopic reflectometer.

5486. The method of claim 5475, wherein the plurality of measurement devices comprise an ellipsometer.

5487. The method of claim 5475, wherein the plurality of measurement devices comprise a spectroscopic ellipsometer.

5488. The method of claim 5475, wherein the plurality of measurement devices comprise a beam profile ellipsometer.

5489. The method of claim 5475, wherein the plurality of measurement devices comprise a dual beam spectrophotometer.

5490. The method of claim 5475, wherein the plurality of measurement devices comprise a bright field imaging device.

5491. The method of claim 5475, wherein the plurality of measurement devices comprise a dark field imaging device.

5492. The method of claim 5475, wherein the plurality of measurement devices comprise a bright field and dark field imaging device.

5493. The method of claim 5475, wherein the plurality of measurement devices comprise a double dark field device.

5494. The method of claim 5475, wherein the plurality of measurement devices comprise a bright field non-imaging device.

5495. The method of claim 5475, wherein the plurality of measurement devices comprise a dark field non-imaging device.

5496. The method of claim 5475, wherein the plurality of measurement devices comprise a bright field and dark field non-imaging device

5497. The method of claim 5475, wherein the plurality of measurement devices comprise a coherence probe microscope.

5498. The method of claim 5475, wherein the plurality of measurement devices comprise an interference microscope.

5499. The method of claim 5475, wherein the plurality of measurement devices comprise an optical profilometer.

5500. The method of claim 5475, wherein the plurality of measurement devices comprise a photo-acoustic device.

5501. The method of claim 5475, wherein the plurality of measurement devices comprise an eddy current device.

5502. The method of claim 5475, wherein the plurality of measurement devices comprise an X-ray reflectometer.

5503. The method of claim 5475, wherein the plurality of measurement devices comprise a grazing X-ray reflectometer.

5504. The method of claim 5475, wherein the plurality of measurement devices comprise an X-ray diffractometer.

5505. The method of claim 5475, wherein the plurality of measurement devices comprises at least a first measurement device and a second measurement device, and wherein elements of the first measurement device comprise elements of the second measurement device.

5506. The method of claim 5475, wherein the defects comprise macro defects.

5507. The method of claim 5475, wherein the presence of defects on the specimen comprises a presence of defects on a bottom surface of the specimen.

5508. The method of claim 5475, further comprising processing the one or more output signals to determine a fifth property of the specimen, wherein the fifth property comprises a flatness measurement of the specimen.

5509. The method of claim 5475, further comprising processing the one or more output signals to determine a fifth property of the specimen, wherein the fifth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5510. The method of claim 5475, wherein processing the one or more output signals to determine the at least four properties of the specimen comprises substantially simultaneously determining the at least four properties of the specimen.

5511. The method of claim 5475, further comprising generating the one or more output signals responsive to one or more of the at least four properties at multiple locations on the surface of the specimen substantially simultaneously such that the one or more properties of the specimen can be determined at the multiple locations substantially simultaneously.

5512. The method of claim 5475, further comprising comparing one or more of the at least four properties of the specimen and properties of a plurality of specimens.

5513. The method of claim 5475, further comprising comparing one or more of the at least four properties of the specimen to a predetermined range for the one or more properties.

5514. The method of claim 5475, further comprising comparing one or more of the at least four properties of the specimen to a predetermined range for the one or more properties and generating an output signal if the one or more properties of the specimen are outside of the predetermined range.

5515. The method of claim 5475, further comprising altering a sampling frequency of at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen.

5516. The method of claim 5475, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen using a feedback control technique.

5517. The method of claim 5475, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen using a feedforward control technique.

5518. The method of claim 5475, further comprising generating a database, wherein the database comprises the at least four properties of the specimen.

5519. The method of claim 5475, further comprising generating a database, wherein the database comprises the at least four properties of the specimen, the method further comprising calibrating the plurality of measurement devices using the database.

5520. The method of claim 5475, further comprising generating a database, wherein the database comprises the at least four properties of the specimen, the method monitoring output signals generated by the plurality of measurement devices using the database.

5521. The method of claim 5475, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four

properties of a plurality of specimens, and wherein the at least four properties of the plurality of specimens are generated using a plurality of systems.

5522. The method of claim 5475, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, and wherein the at least four properties of the plurality of specimens are generated using a plurality of systems, the method further comprising calibrating the plurality of systems using the database.

5523. The method of claim 5475, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, and wherein the at least four properties of the plurality of specimens are generated using a plurality of systems, the method further comprising monitoring output signals generated by the plurality of systems using the database.

5524. The method of claim 5475, wherein a stand alone system is coupled to the plurality of measurement devices, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the plurality of measurement devices with the stand alone system.

5525. The method of claim 5475, wherein a stand alone system is coupled to the plurality of measurement devices and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the plurality of measurement devices and at least the one additional measurement device with the stand alone system.

5526. The method of claim 5475, further comprising determining at least the four properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen at the more than one position on the specimen to reduce within wafer variation of the one or more properties.

5527. The method of claim 5475, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen.

5528. The method of claim 5475, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen using a feedback control technique.

5529. The method of claim 5475, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen using a feedforward control technique.

5530. The method of claim 5475, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the plurality of measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

5531. The method of claim 5530, wherein at least partially processing the one or more output signals comprises determining the at least four properties of the specimen.

5532. The method of claim 5530, wherein further processing the partially processed one or more output signals comprises determining the at least four properties of the specimen.

5533. A computer-implemented method for controlling a system configured to determine at least four properties of a specimen during use, wherein the system comprises a plurality of measurement devices, comprising:

controlling the plurality of measurement devices to generate one or more output signals responsive to at least four properties of the specimen; and

processing the one or more output signals to determine the at least four properties of the specimen, wherein the at least four properties of the specimen comprises a critical dimension of the specimen, overlay misregistration of the specimen, a presence of defects on the specimen, and a thin film characteristic of the specimen.

5534. The method of claim 5533, wherein the system is further configured as a cluster tool.

5535. The method of claim 5533, wherein the system is further configured as a stand alone system.

5536. The method of claim 5533, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement device, and controlling the stage to move laterally while determining the at least four properties of the specimen.

5537. The method of claim 5533, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement device, and controlling the stage to move rotatably while determining the at least four properties of the specimen.

5538. The method of claim 5533, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement device, and controlling the stage to move laterally and rotatably while determining the at least four properties of the specimen.

5539. The method of claim 5533, wherein the plurality of measurement devices comprise a non-imaging scatterometer.

5540. The method of claim 5533, wherein the plurality of measurement devices comprise a scatterometer.

5541. The method of claim 5533, wherein the plurality of measurement devices comprise a spectroscopic scatterometer.

5542. The method of claim 5533, wherein the plurality of measurement devices comprise a reflectometer.

5543. The method of claim 5533, wherein the plurality of measurement devices comprise a spectroscopic reflectometer.

5544. The method of claim 5533, wherein the plurality of measurement devices comprise an ellipsometer.

5545. The method of claim 5533, wherein the plurality of measurement devices comprise a spectroscopic ellipsometer.

5546. The method of claim 5533, wherein the plurality of measurement devices comprise a beam profile ellipsometer.

5547. The method of claim 5533, wherein the plurality of measurement devices comprise a dual beam spectrophotometer.

5548. The method of claim 5533, wherein the plurality of measurement devices comprise a bright field imaging device.

5549. The method of claim 5533, wherein the plurality of measurement devices comprise a dark field imaging device.

5550. The method of claim 5533, wherein the plurality of measurement devices comprise a bright field and dark field imaging device.

5551. The method of claim 5533, wherein the plurality of measurement devices comprise a double dark field device.

5552. The method of claim 5533, wherein the plurality of measurement devices comprise a bright field non-imaging device.

5553. The method of claim 5533, wherein the plurality of measurement devices comprise a dark field non-imaging device.

5554. The method of claim 5533, wherein the plurality of measurement devices comprise a bright field and dark field non-imaging device.

5555. The method of claim 5533, wherein the plurality of measurement devices comprise a coherence probe microscope.

5556. The method of claim 5533, wherein the plurality of measurement devices comprise an interference microscope.

5557. The method of claim 5533, wherein the plurality of measurement devices comprise an optical profilometer.

5558. The method of claim 5533, wherein the plurality of measurement devices comprise a photo-acoustic device.

5559. The method of claim 5533, wherein the plurality of measurement devices comprise an eddy current device.

5560. The method of claim 5533, wherein the plurality of measurement devices comprise an X-ray reflectometer.

5561. The method of claim 5533, wherein the plurality of measurement devices comprise a grazing X-ray reflectometer.

5562. The method of claim 5533, wherein the plurality of measurement devices comprise an X-ray diffractometer.

5563. The method of claim 5533, wherein the plurality of measurement devices comprise at least a first measurement device and a second measurement device, and wherein elements of the first measurement device comprise elements of the second measurement device.

5564. The method of claim 5533, wherein the defects comprise macro defects.

5565. The method of claim 5533, wherein the presence of defects on the specimen comprises a presence of defects on a bottom surface of the specimen.

5566. The method of claim 5533, further comprising processing the one or more output signals to determine a fifth property of the specimen, wherein the fifth property comprises a flatness measurement of the specimen.

5567. The method of claim 5533, further comprising processing the one or more output signals to determine a fifth property of the specimen, wherein the fifth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5568. The method of claim 5533, wherein processing the one or more output signals to determine the at least four properties of the specimen comprises substantially simultaneously determining the at least four properties of the specimen.

5569. The method of claim 5533, further comprising controlling one or more of the plurality of measurement devices to generate one or more output signals responsive to one or more of the at least four properties of the specimen at multiple locations on the surface of the specimen substantially simultaneously such that one or more properties can be determined at the multiple locations substantially simultaneously.

5570. The method of claim 5533, further comprising comparing one or more of the at least four properties of the specimen and properties of a plurality of specimens.

5571. The method of claim 5533, further comprising comparing one or more of the at least four properties of the specimen to a predetermined range for the one or more properties.

5572. The method of claim 5533, further comprising comparing one or more of the at least four properties of the specimen to a predetermined range for the one or more properties and generating an output signal if the one or more properties of the specimen are outside of the predetermined range.

5573. The method of claim 5533, further comprising altering a sampling frequency of at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen.

5574. The method of claim 5533, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen using a feedback control technique.

5575. The method of claim 5533, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen using a feedforward control technique.

5576. The method of claim 5533, further comprising generating a database, wherein the database comprises the at least four properties of the specimen.

5577. The method of claim 5533, further comprising generating a database, wherein the database comprises the at least four properties of the specimen, and calibrating the plurality of measurement devices using the database.

5578. The method of claim 5533, further comprising generating a database, wherein the database comprises the at least four properties of the specimen, and monitoring output signals of the plurality of measurement devices using the database.

5579. The method of claim 5533, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, wherein the at least four properties of the plurality of specimens are generated using a plurality of systems, the method further comprising calibrating the plurality of systems using the database.

5580. The method of claim 5533, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, wherein the at least four properties of the plurality of specimens are generated using a plurality of systems, the method further comprising monitoring output signals of the plurality of systems using the database.

5581. The method of claim 5533, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

5582. The method of claim 5533, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

5583. The method of claim 5533, wherein the system is further configured to determine one or more of the at least four properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen at the more than one position on the specimen to reduce within wafer variation of the one or more properties.

5584. The method of claim 5533, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen.

5585. The method of claim 5533, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen using a feedback control technique.

5586. The method of claim 5533, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen using a feedforward control technique.

5587. The method of claim 5533, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the plurality of measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

5588. The method of claim 5587, wherein at least partially processing the one or more output signals comprises determining the at least four properties of the specimen.

5589. The method of claim 5587, wherein further processing the partially processed one or more output signals comprises determining the at least four properties of the specimen.

5590. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

generating one or more output signals with a plurality of measurement devices, wherein the one or more output signals are responsive to at least four properties of the specimen; and

processing the one or more output signals to determine the at least four properties of the specimen, wherein the at least four properties comprise a critical dimension of the specimen, overlay misregistration of the specimen, a presence of defects on the specimen, and a thin film characteristic of the specimen.

5591. The device of claim 5590, wherein the plurality of measurement devices are configured as a cluster tool.

5592. The device of claim 5590, wherein the plurality of measurement devices are configured as a stand alone system.

5593. The device of claim 5590, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement devices, the method further comprising laterally moving the stage while determining the at least four properties of the specimen.

5594. The device of claim 5590, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement devices, the method further comprising rotatably moving the stage while determining the at least four properties of the specimen.

5595. The device of claim 5590, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement devices, the

method further comprising laterally and rotatably moving the stage during while determining the at least four properties of the specimen.

5596. The device of claim 5590, wherein the plurality of measurement devices comprise a non-imaging scatterometer.

5597. The device of claim 5590, wherein the plurality of measurement devices comprise a scatterometer.

5598. The device of claim 5590, wherein the plurality of measurement devices comprise a spectroscopic scatterometer.

5599. The device of claim 5590, wherein the plurality of measurement devices comprise a reflectometer.

5600. The device of claim 5590, wherein the plurality of measurement devices comprise a spectroscopic reflectometer.

5601. The device of claim 5590, wherein the plurality of measurement devices comprise an ellipsometer.

5602. The device of claim 5590, wherein the plurality of measurement devices comprise a spectroscopic ellipsometer.

5603. The device of claim 5590, wherein the plurality of measurement devices comprise a beam profile ellipsometer.

5604. The device of claim 5590, wherein the plurality of measurement devices comprise a dual beam spectrophotometer.

5605. The device of claim 5590, wherein the plurality of measurement devices comprise a bright field imaging device.

5606. The device of claim 5590, wherein the plurality of measurement devices comprise a dark field imaging device.

5607. The device of claim 5590, wherein the plurality of measurement devices comprise a bright field and dark field imaging device.

5608. The device of claim 5590, wherein the plurality of measurement devices comprise a double dark field device.

5609. The device of claim 5590, wherein the plurality of measurement devices comprise a bright field non-imaging device.

5610. The device of claim 5590, wherein the plurality of measurement devices comprise a dark field non-imaging device.

5611. The device of claim 5590, wherein the plurality of measurement devices comprise a bright field and dark field non-imaging device

5612. The device of claim 5590, wherein the plurality of measurement devices comprise a coherence probe microscope.

5613. The device of claim 5590, wherein the plurality of measurement devices comprise an interference microscope.

5614. The device of claim 5590, wherein the plurality of measurement devices comprise an optical profilometer.

5615. The device of claim 5590, wherein the plurality of measurement devices comprise a photo-acoustic device.

5616. The device of claim 5590, wherein the plurality of measurement devices comprise an eddy current device.

5617. The device of claim 5590, wherein the plurality of measurement devices comprise an X-ray reflectometer.

5618. The device of claim 5590, wherein the plurality of measurement devices comprise a grazing X-ray reflectometer.

5619. The device of claim 5590, wherein the plurality of measurement devices comprise an X-ray diffractometer.

5620. The device of claim 5590, wherein the plurality of measurement devices comprises at least a first measurement device and a second measurement device, and wherein elements of the first measurement device comprise elements of the second measurement device.

5621. The device of claim 5590, wherein the defects comprise macro defects.

5622. The device of claim 5590, wherein the presence of defects on the specimen comprises a presence of defects on a bottom surface of the specimen.

5623. The device of claim 5590, further comprising processing the one or more output signals to determine a fifth property of the specimen, wherein the fifth property comprises a flatness measurement of the specimen.

5624. The device of claim 5590, further comprising processing the one or more output signals to determine a fifth property of the specimen, wherein the fifth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5625. The device of claim 5590, wherein processing the one or more output signals to determine the at least four properties of the specimen comprises substantially simultaneously determining the at least four properties of the specimen.

5626. The device of claim 5590, further comprising generating the one or more output signals responsive to one or more of the at least four properties at multiple locations on the surface of the specimen substantially simultaneously such that the one or more properties of the specimen can be determined at the multiple locations substantially simultaneously.

5627. The device of claim 5590, further comprising comparing one or more of the at least four properties of the specimen and properties of a plurality of specimens.

5628. The device of claim 5590, further comprising comparing one or more of the at least four properties of the specimen to a predetermined range for the one or more properties.

5629. The device of claim 5590, further comprising comparing one or more of the at least four properties of the specimen to a predetermined range for the one or more properties and generating an output signal if the one or more properties of the specimen are outside of the predetermined range.

5630. The device of claim 5590, further comprising altering a sampling frequency of at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen.

5631. The device of claim 5590, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen using a feedback control technique.

5632. The device of claim 5590, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen using a feedforward control technique.

5633. The device of claim 5590, further comprising generating a database, wherein the database comprises the at least four properties of the specimen.

5634. The device of claim 5590, further comprising generating a database, wherein the database comprises the at least four properties of the specimen, the method further comprising calibrating the plurality of measurement devices using the database.

5635. The device of claim 5590, further comprising generating a database, wherein the database comprises the at least four properties of the specimen, the method monitoring output signals generated by the plurality of measurement devices using the database.

5636. The device of claim 5590, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, and wherein the at least four properties of the plurality of specimens are generated using a plurality of systems.

5637. The device of claim 5590, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, and wherein the at least four properties of the plurality of specimens are generated using a plurality of systems, the method further comprising calibrating the plurality of systems using the database.

5638. The device of claim 5590, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, and wherein the at least four properties of the plurality of specimens are generated using a plurality of systems, the method further comprising monitoring output signals generated by the plurality of systems using the database.

5639. The device of claim 5590, wherein a stand alone system is coupled to the plurality of measurement devices, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the plurality of measurement devices with the stand alone system.

5640. The device of claim 5590, wherein a stand alone system is coupled to the plurality of measurement devices and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the plurality of measurement devices and at least the one additional measurement device with the stand alone system.

5641. The device of claim 5590, further comprising determining at least the four properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen at the more than one position on the specimen to reduce within wafer variation of the one or more properties.

5642. The device of claim 5590, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen.

5643. The device of claim 5590, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen using a feedback control technique.

5644. The device of claim 5590, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen using a feedforward control technique.

5645. The device of claim 5590, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the plurality of measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

5646. The device of claim 5645, wherein at least partially processing the one or more output signals comprises determining the at least four properties of the specimen.

5647. The device of claim 5645, wherein further processing the partially processed one or more output signals comprises determining the at least four properties of the specimen.

5648. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

generating one or more output signals with a plurality of measurement devices, wherein the one or more output signals are responsive to at least four properties of the specimen; and

processing the one or more output signals to determine the at least four properties of the specimen, wherein the at least four properties comprise a critical dimension of the specimen, overlay misregistration of the specimen, a presence of defects on the specimen, and a thin film characteristic of the specimen.

5649. The method of claim 5648, wherein the plurality of measurement devices are configured as a cluster tool.

5650. The method of claim 5648, wherein the plurality of measurement devices are configured as a stand alone system.

5651. The method of claim 5648, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement devices, the method further comprising laterally moving the stage while determining the at least four properties of the specimen.

5652. The method of claim 5648, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement devices, the method further comprising rotatably moving the stage while determining the at least four properties of the specimen.

5653. The method of claim 5648, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement devices, the method further comprising laterally and rotatably moving the stage during while determining the at least four properties of the specimen.

5654. The method of claim 5648, wherein the plurality of measurement devices comprise a non-imaging scatterometer.

5655. The method of claim 5648, wherein the plurality of measurement devices comprise a scatterometer.

5656. The method of claim 5648, wherein the plurality of measurement devices comprise a spectroscopic scatterometer.

5657. The method of claim 5648, wherein the plurality of measurement devices comprise a reflectometer.

5658. The method of claim 5648, wherein the plurality of measurement devices comprise a spectroscopic reflectometer.

5659. The method of claim 5648, wherein the plurality of measurement devices comprise an ellipsometer.

5660. The method of claim 5648, wherein the plurality of measurement devices comprise a spectroscopic ellipsometer.

5661. The method of claim 5648, wherein the plurality of measurement devices comprise a beam profile ellipsometer.

5662. The method of claim 5648, wherein the plurality of measurement devices comprise a dual beam spectrophotometer.

5663. The method of claim 5648, wherein the plurality of measurement devices comprise a bright field imaging device.

5664. The method of claim 5648, wherein the plurality of measurement devices comprise a dark field imaging device.

5665. The method of claim 5648, wherein the plurality of measurement devices comprise a bright field and dark field imaging device.

5666. The method of claim 5648, wherein the plurality of measurement devices comprise a double dark field device.

5667. The method of claim 5648, wherein the plurality of measurement devices comprise a bright field non-imaging device.

5668. The method of claim 5648, wherein the plurality of measurement devices comprise a dark field non-imaging device.

5669. The method of claim 5648, wherein the plurality of measurement devices comprise a bright field and dark field non-imaging device

5670. The method of claim 5648, wherein the plurality of measurement devices comprise a coherence probe microscope.

5671. The method of claim 5648, wherein the plurality of measurement devices comprise an interference microscope.

5672. The method of claim 5648, wherein the plurality of measurement devices comprise an optical profilometer.

5673. The method of claim 5648, wherein the plurality of measurement devices comprise a photo-acoustic device.

5674. The method of claim 5648, wherein the plurality of measurement devices comprise an eddy current device.

5675. The method of claim 5648, wherein the plurality of measurement devices comprise an X-ray reflectometer.

5676. The method of claim 5648, wherein the plurality of measurement devices comprise a grazing X-ray reflectometer.

5677. The method of claim 5648, wherein the plurality of measurement devices comprise an X-ray diffractometer.

5678. The method of claim 5648, wherein the plurality of measurement devices comprises at least a first measurement device and a second measurement device, and wherein elements of the first measurement device comprise elements of the second measurement device.

5679. The method of claim 5648, wherein the defects comprise macro defects.

5680. The method of claim 5648, wherein the presence of defects on the specimen comprises a presence of defects on a bottom surface of the specimen.

5681. The method of claim 5648, further comprising processing the one or more output signals to determine a fifth property of the specimen, wherein the fifth property comprises a flatness measurement of the specimen.

5682. The method of claim 5648, further comprising processing the one or more output signals to determine a fifth property of the specimen, wherein the fifth property is selected

from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5683. The method of claim 5648, wherein processing the one or more output signals to determine the at least four properties of the specimen comprises substantially simultaneously determining the at least four properties of the specimen.

5684. The method of claim 5648, further comprising generating the one or more output signals responsive to one or more of the at least four properties at multiple locations on the surface of the specimen substantially simultaneously such that the one or more properties of the specimen can be determined at the multiple locations substantially simultaneously.

5685. The method of claim 5648, further comprising comparing one or more of the at least four properties of the specimen and properties of a plurality of specimens.

5686. The method of claim 5648, further comprising comparing one or more of the at least four properties of the specimen to a predetermined range for the one or more properties.

5687. The method of claim 5648, further comprising comparing one or more of the at least four properties of the specimen to a predetermined range for the one or more properties and generating an output signal if the one or more properties of the specimen are outside of the predetermined range.

5688. The method of claim 5648, further comprising altering a sampling frequency of at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen.

5689. The method of claim 5648, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen using a feedback control technique.

5690. The method of claim 5648, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen using a feedforward control technique.

5691. The method of claim 5648, further comprising generating a database, wherein the database comprises the at least four properties of the specimen.

5692. The method of claim 5648, further comprising generating a database, wherein the database comprises the at least four properties of the specimen, the method further comprising calibrating the plurality of measurement devices using the database.

5693. The method of claim 5648, further comprising generating a database, wherein the database comprises the at least four properties of the specimen, the method monitoring output signals generated by the plurality of measurement devices using the database.

5694. The method of claim 5648, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, and wherein the at least four properties of the plurality of specimens are generated using a plurality of systems.

5695. The method of claim 5648, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, and wherein the at least four properties of the plurality of specimens are generated using a plurality of systems, the method further comprising calibrating the plurality of systems using the database.

5696. The method of claim 5648, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, and wherein the at least four properties of the plurality of specimens are generated using a plurality of systems, the method further comprising monitoring output signals generated by the plurality of systems using the database.

5697. The method of claim 5648, wherein a stand alone system is coupled to the plurality of measurement devices, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the plurality of measurement devices with the stand alone system.

5698. The method of claim 5648, wherein a stand alone system is coupled to the plurality of measurement devices and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the plurality of measurement devices and at least the one additional measurement device with the stand alone system.

5699. The method of claim 5648, further comprising determining at least the four properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to one or

more of the at least four properties of the specimen at the more than one position on the specimen to reduce within wafer variation of the one or more properties.

5700. The method of claim 5648, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen.

5701. The method of claim 5648, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen using a feedback control technique.

5702. The method of claim 5648, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen using a feedforward control technique.

5703. The method of claim 5648, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the plurality of measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

5704. The method of claim 5703, wherein at least partially processing the one or more output signals comprises determining the at least four properties of the specimen.

5705. The method of claim 5703, wherein further processing the partially processed one or more output signals comprises determining the at least four properties of the specimen.

5706. A system configured to determine at least four properties of a specimen during use, comprising:

a plurality of measurement devices, wherein the plurality of measurement devices are configured to generate one or more output signals responsive to the at least four properties of the specimen;

a local processor coupled to the plurality of measurement devices, wherein the local processor is configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals during use and to determine the at least four properties of the specimen during use, and wherein the at least four properties comprise a critical dimension of the specimen, overlay misregistration of the specimen, a presence of defects on the specimen, and a thin film characteristic of the specimen.

5707. The system of claim 5706, wherein the system is further configured as a cluster tool.

5708. The system of claim 5706, wherein the system is further configured as a stand alone system.

5709. The system of claim 5706, further comprising a stage configured to support the specimen during use, wherein the stage is coupled to at least one of the plurality of measurement devices, and wherein the stage is further configured to move laterally during use.

5710. The system of claim 5706, further comprising a stage configured to support the specimen during use, wherein the stage is coupled to at least one of the plurality of measurement devices, and wherein the stage is further configured to move rotatably during use.

5711. The system of claim 5706, further comprising a stage configured to support the specimen during use, wherein the stage is coupled to at least one of the plurality of measurement devices, and wherein the stage is further configured to move laterally and rotatably during use.

5712. The system of claim 5706, wherein the plurality of measurement devices comprise a non-imaging scatterometer.

5713. The system of claim 5706, wherein the plurality of measurement devices comprise a scatterometer.

5714. The system of claim 5706, wherein the plurality of measurement devices comprise a spectroscopic scatterometer.

5715. The system of claim 5706, wherein the plurality of measurement devices comprise a reflectometer.

5716. The system of claim 5706, wherein the plurality of measurement devices comprise a spectroscopic reflectometer.

5717. The system of claim 5706, wherein the plurality of measurement devices comprise an ellipsometer.

5718. The system of claim 5706, wherein the plurality of measurement devices comprise a spectroscopic ellipsometer.

5719. The system of claim 5706, wherein the plurality of measurement devices comprise a beam profile ellipsometer.

5720. The system of claim 5706, wherein the plurality of measurement devices comprise a dual beam spectrophotometer.

5721. The system of claim 5706, wherein the plurality of measurement devices comprise a bright field imaging device.

5722. The system of claim 5706, wherein the plurality of measurement devices comprise a dark field imaging device.

5723. The system of claim 5706, wherein the plurality of measurement devices comprise a bright field and dark field imaging device.

5724. The system of claim 5706, wherein the plurality of measurement devices comprise a bright field non-imaging device.

5725. The system of claim 5706, wherein the plurality of measurement devices comprise a dark field non-imaging device.

5726. The system of claim 5706, wherein the plurality of measurement devices comprise a bright field and dark field non-imaging device.

5727. The system of claim 5706, wherein the plurality of measurement devices comprise a coherence probe microscope.

5728. The system of claim 5706, wherein the plurality of measurement devices comprise an interference microscope.

5729. The system of claim 5706, wherein the plurality of measurement devices comprise an optical profilometer.

5730. The system of claim 5706, wherein the plurality of measurement devices comprise a photo-acoustic device.

5731. The system of claim 5706, wherein the plurality of measurement devices comprise an eddy current device.

5732. The system of claim 5706, wherein the plurality of measurement devices comprise an X-ray reflectometer.

5733. The system of claim 5706, wherein the plurality of measurement devices comprise a grazing X-ray reflectometer.

5734. The system of claim 5706, wherein the plurality of measurement devices comprise an X-ray diffractometer.

5735. The system of claim 5706, wherein the plurality of measurement devices comprise at least a first measurement device and a second measurement device, and wherein at least one element of the first measurement device comprises at least one element of the second measurement device.

5736. The system of claim 5706, wherein the defects comprise macro defects.

5737. The system of claim 5706, wherein the presence of defects on the specimen comprises a presence of defects on a bottom surface of the specimen.

5738. The system of claim 5706, wherein the remote controller computer is further configured to determine a fifth property of the specimen from the at least partially processed one or more output signals during use, and wherein the fifth property comprises a flatness measurement on the specimen.

5739. The system of claim 5706, wherein the remote controller computer is further configured to determine a fifth property of the specimen from the at least partially processed one or more output signals during use, and wherein the fifth property is selected from the group consisting a roughness of the specimen, a specimen of a layer on the specimen, and a roughness of a feature of the specimen.

5740. The system of claim 5706, wherein the system is further configured to determine at least four properties of the specimen substantially simultaneously.

5741. The system of claim 5706, wherein the plurality of measurement devices are further configured to generate one or more output signals responsive to one or more of the at least four properties at multiple locations on the surface of the specimen substantially simultaneously during use such that one or more of the one or more properties of the specimen can be determined at the multiple locations substantially simultaneously.

5742. The system of claim 5706, wherein the remote controller computer is further configured to compare one or more of the at least four properties of the specimen and properties of a plurality of specimens during use.

5743. The system of claim 5706, wherein the remote controller computer is further configured to compare one or more of the at least four properties of the specimen to a predetermined range for the one or more properties during use.

5744. The system of claim 5706, wherein the remote controller computer is further configured to compare one or more of the at least four properties of the specimen to a predetermined range for the one or more properties during use, and wherein the remote controller computer is further configured to generate an output signal if the one or more properties of the specimen are outside of the predetermined range during use.

5745. The system of claim 5706, wherein the remote controller computer is further configured to alter a sampling frequency of at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen during use.

5746. The system of claim 5706, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the plurality of measurement devices in response to one or more of the at least four properties of the specimen using a feedback control technique during use.

5747. The system of claim 5706, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the plurality of measurement devices in response to one or more of the at least four properties of the specimen using a feedforward control technique during use.

5748. The system of claim 5706, wherein the remote controller computer is further configured to generate a database during use, and wherein the database comprises the at least four properties of the specimen.

5749. The system of claim 5706, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least four properties of the specimen, and wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

5750. The system of claim 5706, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least four properties of the specimen, and wherein the remote controller computer is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

5751. The system of claim 5706, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least

four properties of the specimen and the at least four properties of a plurality of specimens, wherein the at least four properties of the plurality of specimens are determined using a plurality of systems, wherein the remote controller computer is further coupled to the plurality of systems, and wherein the remote controller computer is further configured to calibrate one or more measurement devices of the plurality of systems using the database during use.

5752. The system of claim 5706, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, wherein the at least four properties of the plurality of specimens are determined using a plurality of systems, wherein the remote controller computer is further coupled to the plurality of systems, and wherein the remote controller computer is further configured to monitor output signals generated by one or more measurement devices of the plurality of systems using the database during use.

5753. The system of claim 5706, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

5754. The system of claim 5706, further comprising a stand alone system coupled to the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

5755. The system of claim 5706, wherein the system is further configured to determine at least the four properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the remote controller computer is further configured to alter at least one parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen at the more than one position on the specimen to reduce within wafer variation of the one or more properties.

5756. The system of claim 5706, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least four properties using a feedback control technique during use.

5757. The system of claim 5706, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least four properties using a feedforward control technique during use.

5758. A method for determining at least four properties of a specimen, comprising:

generating one or more output signals with a plurality of output signals, wherein the one or more output signals are responsive to at least four properties of the specimen; and

processing the one or more output signals to determine the at least four properties of the specimen, wherein the at least four properties comprise a critical dimension

of the specimen, overlay misregistration of the specimen, a presence of defects on the specimen, and a thin film characteristic of the specimen, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the plurality of measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

5759. The method of claim 5758, wherein the plurality of measurement devices are configured as a cluster tool.

5760. The method of claim 5758, wherein the plurality of measurement devices are configured as a stand alone system.

5761. The method of claim 5758, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement devices, the method further comprising laterally moving the stage while determining the at least four properties of the specimen.

5762. The method of claim 5758, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement devices,

the method further comprising rotatably moving the stage while determining the at least four properties of the specimen.

5763. The method of claim 5758, further comprising supporting the specimen on a stage, wherein the stage is coupled to at least one of the plurality of measurement devices, the method further comprising laterally and rotatably moving the stage during while determining the at least four properties of the specimen.

5764. The method of claim 5758, wherein the plurality of measurement devices comprise a non-imaging scatterometer.

5765. The method of claim 5758, wherein the plurality of measurement devices comprise a scatterometer.

5766. The method of claim 5758, wherein the plurality of measurement devices comprise a spectroscopic scatterometer.

5767. The method of claim 5758, wherein the plurality of measurement devices comprise a reflectometer.

5768. The method of claim 5758, wherein the plurality of measurement devices comprise a spectroscopic reflectometer.

5769. The method of claim 5758, wherein the plurality of measurement devices comprise an ellipsometer.

5770. The method of claim 5758, wherein the plurality of measurement devices comprise a spectroscopic ellipsometer.

5771. The method of claim 5758, wherein the plurality of measurement devices comprise a beam profile ellipsometer.

5772. The method of claim 5758, wherein the plurality of measurement devices comprise a dual beam spectrophotometer.

5773. The method of claim 5758, wherein the plurality of measurement devices comprise a bright field imaging device.

5774. The method of claim 5758, wherein the plurality of measurement devices comprise a dark field imaging device.

5775. The method of claim 5758, wherein the plurality of measurement devices comprise a bright field and dark field imaging device.

5776. The method of claim 5758, wherein the plurality of measurement devices comprise a double dark field device.

5777. The method of claim 5758, wherein the plurality of measurement devices comprise a bright field non-imaging device.

5778. The method of claim 5758, wherein the plurality of measurement devices comprise a dark field non-imaging device.

5779. The method of claim 5758, wherein the plurality of measurement devices comprise a bright field and dark field non-imaging device

5780. The method of claim 5758, wherein the plurality of measurement devices comprise a coherence probe microscope.

5781. The method of claim 5758, wherein the plurality of measurement devices comprise an interference microscope.

5782. The method of claim 5758, wherein the plurality of measurement devices comprise an optical profilometer.

5783. The method of claim 5758, wherein the plurality of measurement devices comprise a photo-acoustic device.

5784. The method of claim 5758, wherein the plurality of measurement devices comprise an eddy current device.

5785. The method of claim 5758, wherein the plurality of measurement devices comprise an X-ray reflectometer.

5786. The method of claim 5758, wherein the plurality of measurement devices comprise a grazing X-ray reflectometer.

5787. The method of claim 5758, wherein the plurality of measurement devices comprise an X-ray diffractometer.

5788. The method of claim 5758, wherein the plurality of measurement devices comprises at least a first measurement device and a second measurement device, and wherein elements of the first measurement device comprise elements of the second measurement device.

5789. The method of claim 5758, wherein the defects comprise macro defects.

5790. The method of claim 5758, wherein the presence of defects on the specimen comprises a presence of defects on a bottom surface of the specimen.

5791. The method of claim 5758, further comprising processing the one or more output signals to determine a fifth property of the specimen, wherein the fifth property comprises a flatness measurement of the specimen.

5792. The method of claim 5758, further comprising processing the one or more output signals to determine a fifth property of the specimen, wherein the fifth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

5793. The method of claim 5758, wherein processing the one or more output signals to determine the at least four properties of the specimen comprises substantially simultaneously determining the at least four properties of the specimen.

5794. The method of claim 5758, further comprising generating the one or more output signals responsive to one or more of the at least four properties at multiple locations on the surface of the specimen substantially simultaneously such that the one or more properties of the specimen can be determined at the multiple locations substantially simultaneously.

5795. The method of claim 5758, further comprising comparing one or more of the at least four properties of the specimen and properties of a plurality of specimens.

5796. The method of claim 5758, further comprising comparing one or more of the at least four properties of the specimen to a predetermined range for the one or more properties.

5797. The method of claim 5758, further comprising comparing one or more of the at least four properties of the specimen to a predetermined range for the one or more properties and generating an output signal if the one or more properties of the specimen are outside of the predetermined range.

5798. The method of claim 5758, further comprising altering a sampling frequency of at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen.

5799. The method of claim 5758, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen using a feedback control technique.

5800. The method of claim 5758, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices in response to one or more of the at least four properties of the specimen using a feedforward control technique.

5801. The method of claim 5758, further comprising generating a database, wherein the database comprises the at least four properties of the specimen.

5802. The method of claim 5758, further comprising generating a database, wherein the database comprises the at least four properties of the specimen, the method further comprising calibrating the plurality of measurement devices using the database.

5803. The method of claim 5758, further comprising generating a database, wherein the database comprises the at least four properties of the specimen, the method monitoring output signals generated by the plurality of measurement devices using the database.

5804. The method of claim 5758, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, and wherein the at least four properties of the plurality of specimens are generated using a plurality of systems.

5805. The method of claim 5758, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, and wherein the at least four properties of the plurality of specimens are generated using a plurality of systems, the method further comprising calibrating the plurality of systems using the database.

5806. The method of claim 5758, further comprising generating a database, wherein the database comprises the at least four properties of the specimen and the at least four properties of a plurality of specimens, and wherein the at least four properties of the plurality of specimens are generated using a plurality of systems, the method further comprising monitoring output signals generated by the plurality of systems using the database.

5807. The method of claim 5758, wherein a stand alone system is coupled to the plurality of measurement devices, the method further comprising calibrating the stand

alone system with a calibration standard and calibrating the plurality of measurement devices with the stand alone system.

5808. The method of claim 5758, wherein a stand alone system is coupled to the plurality of measurement devices and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the plurality of measurement devices and at least the one additional measurement device with the stand alone system.

5809. The method of claim 5758, further comprising determining at least the four properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen at the more than one position on the specimen to reduce within wafer variation of the one or more properties.

5810. The method of claim 5758, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen.

5811. The method of claim 5758, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen using a feedback control technique.

5812. The method of claim 5758, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least four properties of the specimen using a feedforward control technique.

5813. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

two or more measurement devices coupled to the stage, wherein the two or more measurement devices are configured to generate one or more output signals in response to one or more of the at least two properties of the specimen during use; and

a processor coupled to the two or more measurement devices, wherein the processor is configured to determine the at least two properties of the specimen from the one or more output signals during use, and wherein the at least two properties comprise a thickness of a structure on the specimen and at least one additional property of the specimen.

5814. The system of claim 5813, wherein the stage is further configured to move laterally during use.

5815. The system of claim 5813, wherein the stage is further configured to move rotatably during use.

5816. The system of claim 5813, wherein the stage is further configured to move laterally and rotatably during use.

5817. The system of claim 5813, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a grazing X-ray reflectometer.

5818. The system of claim 5813, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a broadband small-spot spectroscopic ellipsometer.

5819. The system of claim 5813, further comprising a pattern recognition system coupled to the stage and the processor, wherein the pattern recognition system is configured to generate one or more output signals during use, and wherein the processor is further configured to process the one or more output signals from the pattern recognition system during use.

5820. The system of claim 5813, wherein at least one element of a first of the two or more measurement devices comprises at least one element of a second of the two or more measurement devices.

5821. The system of claim 5813, wherein the at least one additional property is selected from the group consisting of an index of refraction, a velocity of sound, a density, a critical dimension, and a profile of a layer or a feature formed on the specimen.

5822. The system of claim 5813, wherein the structure comprises a single layer formed on the specimen.

5823. The system of claim 5813, wherein the structure comprises a single layer formed on the specimen, and wherein the single layer is selected from the group consisting of a substantially transparent film, a semi-transparent film, and an opaque metal film.

5824. The system of claim 5813, wherein the structure comprises multiple layers formed on the specimen.

5825. The system of claim 5813, wherein the structure comprises multiple layers formed on the specimen, and wherein the multiple layers comprise two or more layers selected from the group consisting of a substantially transparent film, a semi-transparent film, an opaque metal film, and any combination thereof.

5826. The system of claim 5813, wherein the specimen comprises a blanket wafer.

5827. The system of claim 5813, wherein the specimen comprises a patterned wafer.

5828. The system of claim 5813, further comprising a handling robot configured to dispose the specimen on the stage, wherein the handling robot is coupled to the two or more measurement devices.

5829. The system of claim 5813, further comprising a power supply, wherein the power supply is coupled to the first measurement device and the second measurement device.

5830. The system of claim 5813, further comprising an autofocus mechanism, wherein the autofocus mechanism is configured to bring a specimen substantially into focus for the two or more measurement devices.

5831. The system of claim 5813, wherein the system is coupled to a chemical-mechanical polishing tool.

5832. The system of claim 5813, wherein the system is further configured to determine the at least two properties of the specimen substantially simultaneously during use.

5833. The system of claim 5813, wherein the two or more measurement devices are further configured to generate the one or more output signals in response to one or more

of the at least two properties of the specimen at multiple locations on the surface of the specimen substantially simultaneously such that the one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

5834. The system of claim 5813, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

5835. The system of claim 5813, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

5836. The system of claim 5813, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

5837. The system of claim 5813, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen from the system to the process tool during use.

5838. The system of claim 5813, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen to a process chamber of the process tool during use.

5839. The system of claim 5813, wherein the system is coupled to a process tool, and wherein the system is further configured to determine at least the two properties of the specimen while the specimen is waiting between process steps.

5840. The system of claim 5813, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

5841. The system of claim 5813, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

5842. The system of claim 5813, wherein the system comprises a measurement chamber, wherein the stage and the two or more measurement devices are disposed within the measurement chamber, and wherein the measurement chamber is coupled to a process tool.

5843. The system of claim 5813, wherein the system comprises a measurement chamber, wherein the stage and the two or more measurement devices are disposed within the measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is disposed within the process tool.

5844. The system of claim 5813, wherein the system comprises a measurement chamber, wherein the stage and the two or more measurement devices are disposed within the measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

5845. The system of claim 5813, wherein the system comprises a measurement chamber, wherein the stage and the two or more measurement devices are disposed

within the measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

5846. The system of claim 5813, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

5847. The system of claim 5813, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, wherein the stage is further configured to support the specimen during a process step, and wherein the processor is further configured to determine the at least two properties of the specimen during the process step.

5848. The system of claim 5813, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, wherein the stage is further configured to support the specimen during a process step, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

5849. The system of claim 5813, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, wherein the stage is further configured to support the specimen during a process step, wherein the processor is coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties using an in situ control technique during use.

5850. The system of claim 5813, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

5851. The system of claim 5813, wherein a process tool comprises a first process chamber and a second process chamber, wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use, and wherein the processor is further configured to determine at least the two properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

5852. The system of claim 5813, wherein the processor is further configured to compare the at least two properties of the specimen and properties of a plurality of specimens during use.

5853. The system of claim 5813, wherein the processor is further configured to compare one or more of the at least two properties of the specimen to a predetermined range for the one or more properties during use.

5854. The system of claim 5813, wherein the processor is further configured to compare one or more of the at least two properties of the specimen to a predetermined range for the one or more properties during use, and wherein the processor is further configured to generate an output signal if the one or more properties of the specimen are outside of the predetermined range during use.

5855. The system of claim 5813, wherein the processor is further configured to alter a sampling frequency of at least one of the two or more measurement devices in response to one or more of the at least two properties during use.

5856. The system of claim 5813, wherein the processor is further configured to alter a parameter of one or more instruments coupled to at least one of the two or more measurement devices in response to one or more of the at least two properties using a feedback control technique during use.

5857. The system of claim 5813, wherein the processor is further configured to alter a parameter of one or more instruments coupled to at least one of the two or more measurement devices in response to one or more of the at least two properties using a feedforward control technique during use.

5858. The system of claim 5813, wherein the processor is further configured to generate a database during use, and wherein the database comprises the at least two properties of the specimen.

5859. The system of claim 5813, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least two properties of the specimen, and wherein the processor is further configured to calibrate the two or more measurement devices using the database during use.

5860. The system of claim 5813, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least two properties of the specimen, and wherein the processor is further configured to monitor output signals generated by the two or more measurement devices using the database during use.

5861. The system of claim 5813, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least two properties of the specimen and at least two properties of a plurality of specimens, wherein the at least two properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

5862. The system of claim 5813, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least two properties of the specimen and at least two properties of a plurality of specimens, wherein the at least two properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

5863. The system of claim 5813, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

5864. The system of claim 5813, further comprising a stand alone system coupled to the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

5865. The system of claim 5813, wherein the system is further configured to determine one or more of the at least two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to the one or more of the at least two properties of the specimen at the more than one position on the specimen to reduce within wafer variation of the one or more properties.

5866. The system of claim 5813, wherein the processor is coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties using a feedback control technique during use.

5867. The system of claim 5813, wherein the processor is coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties using a feedforward control technique during use.

5868. The system of claim 5813, wherein the processor is coupled to a process tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

5869. The system of claim 5868, wherein the processor is further configured to determine a relationship between one or more of the at least two properties and at least one of the monitored parameters during use.

5870. The system of claim 5869, wherein the processor is further configured to alter a parameter of the one or more instruments in response to the determined relationship during use.

5871. The system of claim 5813, wherein the processor comprises a local processor coupled to the two or more measurement devices and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

5872. The system of claim 5871, wherein the local processor is further configured to determine the at least two properties of the specimen during use.

5873. The system of claim 5871, wherein the remote controller computer is further configured to determine the at least two properties of the specimen during use.

5874. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to two or more measurement devices;

generating one or more output signals with the two or more measurement devices, wherein the one or more output signals are responsive to the at least two properties of the specimen; and

processing the one or more output signals to determine the at least two properties of the specimen, wherein the at least two properties of the specimen comprise a

thickness of a structure on the specimen and at least one additional property of the specimen.

5875. The method of claim 5874, further comprising laterally moving the stage while determining the at least two properties of the specimen.

5876. The method of claim 5874, further comprising rotatably moving the stage while determining the at least two properties of the specimen.

5877. The method of claim 5874, further comprising laterally and rotatably moving the stage while determining the at least two properties of the specimen.

5878. The method of claim 5874, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a grazing X-ray reflectometer.

5879. The method of claim 5874, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a broadband small-spot spectroscopic ellipsometer.

5880. The method of claim 5874, wherein the stage is further coupled to a pattern recognition system, the method further comprising generating one or more output signals with the pattern recognition system and processing the one or more output signals from the pattern recognition system.

5881. The method of claim 5874, wherein at least one element of a first of the two measurement devices comprises at least one element of a second of the two measurement devices.

5882. The method of claim 5874, wherein the at least one additional property is selected from the group consisting of an index of refraction, a velocity of sound, a density, a critical dimension, and a profile of a layer or a feature formed on the specimen.

5883. The method of claim 5874, wherein the structure comprises a single layer formed on the specimen.

5884. The method of claim 5874, wherein the structure comprises a single layer formed on the specimen, and wherein the single layer is selected from the group consisting of a substantially transparent film, a semi-transparent film, and an opaque metal film.

5885. The method of claim 5874, wherein the structure comprises multiple layers formed on the specimen.

5886. The method of claim 5874, wherein the structure comprises multiple layers formed on the specimen, and wherein the multiple layers comprise two or more layers selected from the group consisting of a substantially transparent film, a semi-transparent film, an opaque metal film, and any combination thereof.

5887. The method of claim 5874, wherein the specimen comprises a blanket wafer.

5888. The method of claim 5874, wherein the specimen comprises a patterned wafer.

5889. The method of claim 5874, wherein disposing the specimen on the stage comprises disposing the specimen on the stage with a handling robot, wherein the handling robot is coupled to the two or more measurement devices.

5890. The method of claim 5874, further comprising bringing the specimen substantially into focus for the two or more measurement devices with an autofocus mechanism.

5891. The method of claim 5874, wherein the stage and the two or more measurement devices are coupled to a chemical-mechanical polishing tool.

5892. The method of claim 5874, wherein processing the one or more output signals to determine the at least two properties of the specimen comprises substantially simultaneously determining the at least two properties of the specimen.

5893. The method of claim 5874, further comprising generating the one or more output signals responsive to one or more of the at least two properties of the specimen at multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

5894. The method of claim 5874, wherein the stage and the two or more measurement devices are coupled to a process tool, and wherein the stage and the two or more measurement devices are arranged laterally proximate to the process tool.

5895. The method of claim 5874, wherein the stage and the two or more measurement devices are coupled to a process tool, and wherein the stage and the two or more measurement devices are disposed within the process tool.

5896. The method of claim 5874, wherein the stage and the two or more measurement devices are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

5897. The method of claim 5874, wherein the stage and the two or more measurement devices are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to generating the one or more output signals.

5898. The method of claim 5874, wherein the stage and the two or more measurement devices are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

5899. The method of claim 5874, wherein the stage and the two or more measurement devices are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

5900. The method of claim 5874, wherein the stage and the two or more measurement devices are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

5901. The method of claim 5874, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

5902. The method of claim 5874, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is disposed within the process tool.

5903. The method of claim 5874, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

5904. The method of claim 5874, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

5905. The method of claim 5874, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

5906. The method of claim 5874, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising determining the at least two properties of the specimen during the process step.

5907. The method of claim 5874, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

5908. The method of claim 5874, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising altering a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties using an in situ control technique.

5909. The method of claim 5874, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

5910. The method of claim 5874, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool, the method further comprising determining the at least two properties of the specimen during said moving the specimen from the first process chamber to the second process chamber.

5911. The method of claim 5874, further comprising comparing one or more of the at least two properties of the specimen and properties of a plurality of specimens.

5912. The method of claim 5874, further comprising comparing one or more of the at least two properties of the specimen to a predetermined range for the one or more properties.

5913. The method of claim 5874, further comprising comparing one or more of the at least two properties of the specimen to a predetermined range for the one or more properties and generating an output signal if the one or more of the at least two properties of the specimen are outside of the predetermined range.

5914. The method of claim 5874, further comprising altering a sampling frequency of at least one of the two or more measurement devices in response to one or more of the at least two properties of the specimen.

5915. The method of claim 5874, further comprising altering a parameter of one or more instruments coupled to at least one of the two or more measurement devices in response to one or more of the at least two properties of the specimen using a feedback control technique.

5916. The method of claim 5874, further comprising altering a parameter of one or more instruments coupled to at least one of the two or more measurement devices in response to one or more of the at least two properties of the specimen using a feedforward control technique.

5917. The method of claim 5874, further comprising generating a database, wherein the database comprises the at least two properties of the specimen.

5918. The method of claim 5874, further comprising generating a database, wherein the database comprises the at least two properties of the specimen, the method further comprising calibrating the two or more measurement devices using the database.

5919. The method of claim 5874, further comprising generating a database, wherein the database comprises the at least two properties of the specimen, the method further comprising monitoring output signals generated by the two or more measurement devices using the database.

5920. The method of claim 5874, further comprising generating a database, wherein the database comprises the at least two properties of the specimen and at least two properties of a plurality of specimens, and wherein the at least two properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

5921. The method of claim 5874, further comprising generating a database, wherein the database comprises the at least two properties of the specimen and at least two properties of a plurality of specimens, and wherein the at least two properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals generated by the plurality of measurement devices using the database.

5922. The method of claim 5874, wherein a stand alone system is coupled to the two or more measurement devices, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the two or more measurement devices with the stand alone system.

5923. The method of claim 5874, wherein a stand alone system is coupled to the two or more measurement devices and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the two or more measurement devices and at least the one additional measurement device with the stand alone system.

5924. The method of claim 5874, further comprising determining one or more of the at least two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to the one or

more of the at least two properties of the specimen at the more than one position on the specimen to reduce within wafer variation of the one or more of the at least two properties.

5925. The method of claim 5874, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedback control technique.

5926. The method of claim 5874, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedforward control technique.

5927. The method of claim 5874, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

5928. The method of claim 5874, further comprising monitoring a parameter of one or more instruments coupled to a process tool and determining a relationship between one or more of the at least two properties and at least one of the monitored parameters.

5929. The method of claim 5874, further comprising monitoring a parameter of one or more instruments coupled to a process tool, determining a relationship between one or more of the at least two properties and at least one of the monitored parameters, and altering the parameter of the one or more instruments in response to the relationship.

5930. The method of claim 5874, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the two or more measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

5931. The method of claim 5930, wherein at least partially processing the one or more output signals comprises determining the at least two properties of the specimen.

5932. The method of claim 5930, wherein further processing the partially processed one or more output signals comprises determining the at least two properties of the specimen.

5933. A computer-implemented method for controlling a system configured to determine at least two properties of a specimen during use, wherein the system comprises a stage coupled to two or more measurement devices, and wherein the stage is configured to support the specimen during use, the method comprising:

controlling the two or more measurement devices to generate one or more output signals responsive to the at least two properties of the specimen; and

processing the one or more output signals to determine the at least two properties of the specimen, wherein the at least two properties of the specimen comprise a thickness of a structure on the specimen and at least one additional property of the specimen.

5934. The method of claim 5933, further comprising controlling the stage to move laterally while determining the at least two properties of the specimen.

5935. The method of claim 5933, further comprising controlling the stage to move rotatably while determining the at least two properties of the specimen.

5936. The method of claim 5933, further comprising controlling the stage to move laterally and rotatably while determining the at least two properties of the specimen.

5937. The method of claim 5933, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a grazing X-ray reflectometer.

5938. The method of claim 5933, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a broadband small-spot spectroscopic ellipsometer.

5939. The method of claim 5933, wherein the system further comprises a pattern recognition system, the method further comprising controlling the pattern recognition system to generate one or more output signals with the pattern recognition system and processing the one or more output signals from the pattern recognition system.

5940. The method of claim 5933, wherein at least one element of a first of the two or more measurement devices comprises at least one element of a second of the two or more measurement devices.

5941. The method of claim 5933, wherein the at least one additional property is selected from the group consisting of an index of refraction, a velocity of sound, a density, a critical dimension, and a profile of a layer or a feature formed on the specimen.

5942. The method of claim 5933, wherein the structure comprises a single layer formed on the specimen.

5943. The method of claim 5933, wherein the structure comprises a single layer formed on the specimen, and wherein the single layer is selected from the group consisting of a substantially transparent film, a semi-transparent film, and an opaque metal film.

5944. The method of claim 5933, wherein the structure comprises multiple layers formed on the specimen.

5945. The method of claim 5933, wherein the structure comprises multiple layers formed on the specimen, and wherein the multiple layers comprise two or more layers selected from the group consisting of a substantially transparent film, a semi-transparent film, an opaque metal film, and any combination thereof.

5946. The method of claim 5933, wherein the specimen comprises a blanket wafer.

5947. The method of claim 5933, wherein the specimen comprises a patterned wafer.

5948. The method of claim 5933, further comprising controlling a handling robot to disposed the specimen on the specimen, wherein the handling robot is coupled to the two or more measurement devices.

5949. The method of claim 5933, further comprising bringing the specimen substantially into focus for the two or more measurement devices with an autofocus mechanism.

5950. The method of claim 5933, wherein the system is coupled to a chemical-mechanical polishing tool.

5951. The method of claim 5933, wherein processing the one or more output signals to determine the at least two properties of the specimen comprises substantially simultaneously determining the at least two properties of the specimen.

5952. The method of claim 5933, further comprising controlling the two or more measurement devices to generate the one or more output signals responsive to one or more of the at least two properties of the specimen at multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

5953. The method of claim 5933, wherein the stage and the two or more measurement devices are coupled to a process tool, and wherein the stage and the two or more measurement devices are arranged laterally proximate to the process tool.

5954. The method of claim 5933, wherein the stage and the two or more measurement devices are coupled to a process tool, and wherein the stage and the two or more measurement devices are disposed within the process tool.

5955. The method of claim 5933, wherein the stage and the two or more measurement devices are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage, and wherein the wafer handler is coupled to the process tool.

5956. The method of claim 5933, wherein the stage and the two or more measurement devices are coupled to a process tool, the method further comprising controlling the stage to move the specimen from the system to the process tool.

5957. The method of claim 5933, wherein the stage and the two or more measurement devices are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage such that at least the two properties of the specimen can be determined while the specimen is waiting between process steps.

5958. The method of claim 5933, wherein the stage and the two or more measurement devices are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

5959. The method of claim 5933, wherein the stage and the two or more measurement devices are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

5960. The method of claim 5933, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

5961. The method of claim 5933, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is disposed within the process tool.

5962. The method of claim 5933, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

5963. The method of claim 5933, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

5964. The method of claim 5933, wherein the stage comprises a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

5965. The method of claim 5933, wherein the stage comprises a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising controlling the two or more measurement devices to generate the one or more output signals during the process step.

5966. The method of claim 5933, wherein the stage comprises a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising controlling the system to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

5967. The method of claim 5933, wherein the stage comprises a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising controlling the system to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties using an in situ control technique.

5968. The method of claim 5933, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

5969. The method of claim 5933, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool, the method further comprising controlling the two or more measurement devices to generate the one or more output signals during said moving the specimen from the first process chamber to the second process chamber.

5970. The method of claim 5933, further comprising comparing one or more of the at least two properties of the specimen and properties of a plurality of specimens.

5971. The method of claim 5933, further comprising comparing one or more of the at least two properties of the specimen to a predetermined range for the one or more properties.

5972. The method of claim 5933, further comprising comparing one or more of the at least two properties of the specimen to a predetermined range for the one or more properties and generating an output signal if the one or more of the at least two properties of the specimen are outside of the predetermined range.

5973. The method of claim 5933, further comprising altering a sampling frequency of at least one of the two or more measurement devices in response to one or more of the at least two properties of the specimen.

5974. The method of claim 5933, further comprising altering a parameter of one or more instruments coupled to the at least one of the two or more measurement devices in response to one or more of the at least two properties using a feedback control technique.

5975. The method of claim 5933, further comprising altering a parameter of one or more instruments coupled to the at least one of the two or more measurement devices in response to one or more of the at least two properties using a feedforward control technique.

5976. The method of claim 5933, further comprising generating a database, wherein the database comprises the at least two properties of the specimen.

5977. The method of claim 5933, further comprising generating a database, wherein the database comprises the at least two properties of the specimen, the method further comprising calibrating the two or more measurement devices using the database.

5978. The method of claim 5933, further comprising generating a database, wherein the database comprises the at least two properties of the specimen, the method further comprising monitoring output signals of the two or more measurement devices using the database.

5979. The method of claim 5933, further comprising generating a database, wherein the database comprises the at least two properties of the specimen and at least the two

properties of a plurality of specimens, wherein the at least two properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

5980. The method of claim 5933, further comprising generating a database, wherein the database comprises the at least two properties of the specimen and at least the two properties of a plurality of specimens, wherein the at least two properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

5981. The method of claim 5933, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

5982. The method of claim 5933, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

5983. The method of claim 5933, wherein the system is further configured to determine one or more of the at least two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to the one or more of the at least two properties of the specimen

at the more than one position on the specimen to reduce within wafer variation of the one or more of the at least two properties.

5984. The method of claim 5933, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedback control technique.

5985. The method of claim 5933, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedforward control technique.

5986. The method of claim 5933, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

5987. The method of claim 5933, further comprising monitoring a parameter of one or more instruments coupled to the process tool and determining a relationship between one or more of the at least two properties of the specimen and at least one of the monitored parameters.

5988. The method of claim 5933, further comprising monitoring a parameter of one or more instruments coupled to the process tool, determining a relationship between one or more of the at least two properties of the specimen and at least one of the monitored parameters, and altering the parameter of at least one of the instruments in response to the relationship.

5989. The method of claim 5933, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the two or more measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

5990. The method of claim 5989, wherein at least partially processing the one or more output signals comprises determining the at least two properties of the specimen.

5991. The method of claim 5989, wherein further processing the partially processed one or more output signals comprises determining the at least two properties of the specimen.

5992. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to two or more measurement devices;

generating one or more output signals with the two or more measurement devices, wherein the one or more output signals are responsive to the at least two properties of the specimen; and

processing the one or more output signals to determine the at least two properties of the specimen, wherein the at least two properties of the specimen comprise a

thickness of a structure on the specimen and at least one additional property of the specimen.

5993. The device of claim 5992, further comprising laterally moving the stage while determining the at least two properties of the specimen.

5994. The device of claim 5992, further comprising rotatably moving the stage while determining the at least two properties of the specimen.

5995. The device of claim 5992, further comprising laterally and rotatably moving the stage while determining the at least two properties of the specimen.

5996. The device of claim 5992, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a grazing X-ray reflectometer.

5997. The device of claim 5992, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a broadband small-spot spectroscopic ellipsometer.

5998. The device of claim 5992, wherein the stage is further coupled to a pattern recognition system, the method further comprising generating one or more output signals with the pattern recognition system and processing the one or more output signals from the pattern recognition system.

5999. The device of claim 5992, wherein at least one element of a first of the two measurement devices comprises at least one element of a second of the two measurement devices.

6000. The device of claim 5992, wherein the at least one additional property is selected from the group consisting of an index of refraction, a velocity of sound, a density, a critical dimension, and a profile of a layer or a feature formed on the specimen.

6001. The device of claim 5992, wherein the structure comprises a single layer formed on the specimen.

6002. The device of claim 5992, wherein the structure comprises a single layer formed on the specimen, and wherein the single layer is selected from the group consisting of a substantially transparent film, a semi-transparent film, and an opaque metal film.

6003. The device of claim 5992, wherein the structure comprises multiple layers formed on the specimen.

6004. The device of claim 5992, wherein the structure comprises multiple layers formed on the specimen, and wherein the multiple layers comprise two or more layers selected from the group consisting of a substantially transparent film, a semi-transparent film, an opaque metal film, and any combination thereof.

6005. The device of claim 5992, wherein the specimen comprises a blanket wafer.

6006. The device of claim 5992, wherein the specimen comprises a patterned wafer.

6007. The device of claim 5992, wherein disposing the specimen on the stage comprises disposing the specimen on the stage with a handling robot, wherein the handling robot is coupled to the two or more measurement devices.

6008. The device of claim 5992, further comprising bringing the specimen substantially into focus for the two or more measurement devices with an autofocus mechanism.

6009. The device of claim 5992, wherein the stage and the two or more measurement devices are coupled to a chemical-mechanical polishing tool.

6010. The device of claim 5992, wherein processing the one or more output signals to determine the at least two properties of the specimen comprises substantially simultaneously determining the at least two properties of the specimen.

6011. The device of claim 5992, further comprising generating the one or more output signals responsive to one or more of the at least two properties of the specimen at multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

6012. The device of claim 5992, wherein the stage and the two or more measurement devices are coupled to a process tool, and wherein the stage and the two or more measurement devices are arranged laterally proximate to the process tool.

6013. The device of claim 5992, wherein the stage and the two or more measurement devices are coupled to a process tool, and wherein the stage and the two or more measurement devices are disposed within the process tool.

6014. The device of claim 5992, wherein the stage and the two or more measurement devices are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

6015. The device of claim 5992, wherein the stage and the two or more measurement devices are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to generating the one or more output signals.

6016. The device of claim 5992, wherein the stage and the two or more measurement devices are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

6017. The device of claim 5992, wherein the stage and the two or more measurement devices are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

6018. The device of claim 5992, wherein the stage and the two or more measurement devices are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

6019. The device of claim 5992, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

6020. The device of claim 5992, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is disposed within the process tool.

6021. The device of claim 5992, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

6022. The device of claim 5992, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

6023. The device of claim 5992, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

6024. The device of claim 5992, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising determining the at least two properties of the specimen during the process step.

6025. The device of claim 5992, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

6026. The device of claim 5992, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising altering a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties using an in situ control technique.

6027. The device of claim 5992, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

6028. The device of claim 5992, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool, the method further comprising determining the at least two properties of the specimen during said moving the specimen from the first process chamber to the second process chamber.

6029. The device of claim 5992, further comprising comparing one or more of the at least two properties of the specimen and properties of a plurality of specimens.

6030. The device of claim 5992, further comprising comparing one or more of the at least two properties of the specimen to a predetermined range for the one or more properties.

6031. The device of claim 5992, further comprising comparing one or more of the at least two properties of the specimen to a predetermined range for the one or more properties and generating an output signal if the one or more of the at least two properties of the specimen are outside of the predetermined range.

6032. The device of claim 5992, further comprising altering a sampling frequency of at least one of the two or more measurement devices in response to one or more of the at least two properties of the specimen.

6033. The device of claim 5992, further comprising altering a parameter of one or more instruments coupled to at least one of the two or more measurement devices in response to one or more of the at least two properties of the specimen using a feedback control technique.

6034. The device of claim 5992, further comprising altering a parameter of one or more instruments coupled to at least one of the two or more measurement devices in response to one or more of the at least two properties of the specimen using a feedforward control technique.

6035. The device of claim 5992, further comprising generating a database, wherein the database comprises the at least two properties of the specimen.

6036. The device of claim 5992, further comprising generating a database, wherein the database comprises the at least two properties of the specimen, the method further comprising calibrating the two or more measurement devices using the database.

6037. The device of claim 5992, further comprising generating a database, wherein the database comprises the at least two properties of the specimen, the method further comprising monitoring output signals generated by the two or more measurement devices using the database.

6038. The device of claim 5992, further comprising generating a database, wherein the database comprises the at least two properties of the specimen and at least two properties of a plurality of specimens, and wherein the at least two properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

6039. The device of claim 5992, further comprising generating a database, wherein the database comprises the at least two properties of the specimen and at least two properties of a plurality of specimens, and wherein the at least two properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals generated by the plurality of measurement devices using the database.

6040. The device of claim 5992, wherein a stand alone system is coupled to the two or more measurement devices, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the two or more measurement devices with the stand alone system.

6041. The device of claim 5992, wherein a stand alone system is coupled to the two or more measurement devices and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the two or more measurement devices and at least the one additional measurement device with the stand alone system.

6042. The device of claim 5992, further comprising determining one or more of the at least two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to the one or

more of the at least two properties of the specimen at the more than one position on the specimen to reduce within wafer variation of the one or more of the at least two properties.

6043. The device of claim 5992, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedback control technique.

6044. The device of claim 5992, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedforward control technique.

6045. The device of claim 5992, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

6046. The device of claim 5992, further comprising monitoring a parameter of one or more instruments coupled to a process tool and determining a relationship between one or more of the at least two properties and at least one of the monitored parameters.

6047. The device of claim 5992, further comprising monitoring a parameter of one or more instruments coupled to a process tool, determining a relationship between one or more of the at least two properties and at least one of the monitored parameters, and altering the parameter of the one or more instruments in response to the relationship.

6048. The device of claim 5992, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the two or more measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

6049. The device of claim 6048, wherein at least partially processing the one or more output signals comprises determining the at least two properties of the specimen.

6050. The device of claim 6048, wherein further processing the partially processed one or more output signals comprises determining the at least two properties of the specimen.

6051. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to two or more measurement devices;

generating one or more output signals with the two or more measurement devices, wherein the one or more output signals are responsive to the at least two properties of the specimen; and

processing the one or more output signals to determine the at least two properties of the specimen, wherein the at least two properties of the specimen comprise a

thickness of a structure on the specimen and at least one additional property of the specimen.

6052. The method of claim 6051, further comprising laterally moving the stage while determining the at least two properties of the specimen.

6053. The method of claim 6051, further comprising rotatably moving the stage while determining the at least two properties of the specimen.

6054. The method of claim 6051, further comprising laterally and rotatably moving the stage while determining the at least two properties of the specimen.

6055. The method of claim 6051, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a grazing X-ray reflectometer.

6056. The method of claim 6051, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a broadband small-spot spectroscopic ellipsometer.

6057. The method of claim 6051, wherein the stage is further coupled to a pattern recognition system, the method further comprising generating one or more output signals with the pattern recognition system and processing the one or more output signals from the pattern recognition system.

6058. The method of claim 6051, wherein at least one element of a first of the two measurement devices comprises at least one element of a second of the two measurement devices.

6059. The method of claim 6051, wherein the at least one additional property is selected from the group consisting of an index of refraction, a velocity of sound, a density, a critical dimension, and a profile of a layer or a feature formed on the specimen.

6060. The method of claim 6051, wherein the structure comprises a single layer formed on the specimen.

6061. The method of claim 6051, wherein the structure comprises a single layer formed on the specimen, and wherein the single layer is selected from the group consisting of a substantially transparent film, a semi-transparent film, and an opaque metal film.

6062. The method of claim 6051, wherein the structure comprises multiple layers formed on the specimen.

6063. The method of claim 6051, wherein the structure comprises multiple layers formed on the specimen, and wherein the multiple layers comprise two or more layers selected from the group consisting of a substantially transparent film, a semi-transparent film, an opaque metal film, and any combination thereof.

6064. The method of claim 6051, wherein the specimen comprises a blanket wafer.

6065. The method of claim 6051, wherein the specimen comprises a patterned wafer.

6066. The method of claim 6051, wherein disposing the specimen on the stage comprises disposing the specimen on the stage with a handling robot, wherein the handling robot is coupled to the two or more measurement devices.

6067. The method of claim 6051, further comprising bringing the specimen substantially into focus for the two or more measurement devices with an autofocus mechanism.

6068. The method of claim 6051, wherein the stage and the two or more measurement devices are coupled to a chemical-mechanical polishing tool.

6069. The method of claim 6051, wherein processing the one or more output signals to determine the at least two properties of the specimen comprises substantially simultaneously determining the at least two properties of the specimen.

6070. The method of claim 6051, further comprising generating the one or more output signals responsive to one or more of the at least two properties of the specimen at multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

6071. The method of claim 6051, wherein the stage and the two or more measurement devices are coupled to a process tool, and wherein the stage and the two or more measurement devices are arranged laterally proximate to the process tool.

6072. The method of claim 6051, wherein the stage and the two or more measurement devices are coupled to a process tool, and wherein the stage and the two or more measurement devices are disposed within the process tool.

6073. The method of claim 6051, wherein the stage and the two or more measurement devices are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

6074. The method of claim 6051, wherein the stage and the two or more measurement devices are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to generating the one or more output signals.

6075. The method of claim 6051, wherein the stage and the two or more measurement devices are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

6076. The method of claim 6051, wherein the stage and the two or more measurement devices are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

6077. The method of claim 6051, wherein the stage and the two or more measurement devices are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

6078. The method of claim 6051, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

6079. The method of claim 6051, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is disposed within the process tool.

6080. The method of claim 6051, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

6081. The method of claim 6051, wherein the stage and the two or more measurement devices are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

6082. The method of claim 6051, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

6083. The method of claim 6051, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising determining the at least two properties of the specimen during the process step.

6084. The method of claim 6051, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

6085. The method of claim 6051, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising altering a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties using an in situ control technique.

6086. The method of claim 6051, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

6087. The method of claim 6051, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool, the method further comprising determining the at least two properties of the specimen during said moving the specimen from the first process chamber to the second process chamber.

6088. The method of claim 6051, further comprising comparing one or more of the at least two properties of the specimen and properties of a plurality of specimens.

6089. The method of claim 6051, further comprising comparing one or more of the at least two properties of the specimen to a predetermined range for the one or more properties.

6090. The method of claim 6051, further comprising comparing one or more of the at least two properties of the specimen to a predetermined range for the one or more properties and generating an output signal if the one or more of the at least two properties of the specimen are outside of the predetermined range.

6091. The method of claim 6051, further comprising altering a sampling frequency of at least one of the two or more measurement devices in response to one or more of the at least two properties of the specimen.

6092. The method of claim 6051, further comprising altering a parameter of one or more instruments coupled to at least one of the two or more measurement devices in response to one or more of the at least two properties of the specimen using a feedback control technique.

6093. The method of claim 6051, further comprising altering a parameter of one or more instruments coupled to at least one of the two or more measurement devices in response to one or more of the at least two properties of the specimen using a feedforward control technique.

6094. The method of claim 6051, further comprising generating a database, wherein the database comprises the at least two properties of the specimen.

6095. The method of claim 6051, further comprising generating a database, wherein the database comprises the at least two properties of the specimen, the method further comprising calibrating the two or more measurement devices using the database.

6096. The method of claim 6051, further comprising generating a database, wherein the database comprises the at least two properties of the specimen, the method further comprising monitoring output signals generated by the two or more measurement devices using the database.

6097. The method of claim 6051, further comprising generating a database, wherein the database comprises the at least two properties of the specimen and at least two properties of a plurality of specimens, and wherein the at least two properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

6098. The method of claim 6051, further comprising generating a database, wherein the database comprises the at least two properties of the specimen and at least two properties of a plurality of specimens, and wherein the at least two properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals generated by the plurality of measurement devices using the database.

6099. The method of claim 6051, wherein a stand alone system is coupled to the two or more measurement devices, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the two or more measurement devices with the stand alone system.

6100. The method of claim 6051, wherein a stand alone system is coupled to the two or more measurement devices and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the two or more measurement devices and at least the one additional measurement device with the stand alone system.

6101. The method of claim 6051, further comprising determining one or more of the at least two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to the one or

more of the at least two properties of the specimen at the more than one position on the specimen to reduce within wafer variation of the one or more of the at least two properties.

6102. The method of claim 6051, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedback control technique.

6103. The method of claim 6051, further comprising altering a parameter of one or more instruments coupled to a process tool in response to one or more of the at least two properties of the specimen using a feedforward control technique.

6104. The method of claim 6051, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

6105. The method of claim 6051, further comprising monitoring a parameter of one or more instruments coupled to a process tool and determining a relationship between one or more of the at least two properties and at least one of the monitored parameters.

6106. The method of claim 6051, further comprising monitoring a parameter of one or more instruments coupled to a process tool, determining a relationship between one or more of the at least two properties and at least one of the monitored parameters, and altering the parameter of the one or more instruments in response to the relationship.

6107. The method of claim 6051, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the two or more measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

6108. The method of claim 6107, wherein at least partially processing the one or more output signals comprises determining the at least two properties of the specimen.

6109. The method of claim 6107, wherein further processing the partially processed one or more output signals comprises determining the at least two properties of the specimen.

6110. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

two or more measurement devices coupled to the stage, wherein the two or more measurement devices are configured to generate one or more output signals in response to one or more of the at least two properties of the specimen during use;

a local processor coupled to the two or more measurement devices and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine the at least two properties of the specimen from the at least partially processed one or more output signals during use, and wherein the at least two properties comprise a thickness of a structure on the specimen and at least one additional property of the specimen.

6111. The system of claim 6110, wherein the stage is further configured to move laterally during use.

6112. The system of claim 6110, wherein the stage is further configured to move rotatably during use.

6113. The system of claim 6110, wherein the stage is further configured to move laterally and rotatably during use.

6114. The system of claim 6110, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a grazing X-ray reflectometer.

6115. The system of claim 6110, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a broadband small-spot spectroscopic ellipsometer.

6116. The system of claim 6110, further comprising a pattern recognition system coupled to the stage and the local processor, wherein the pattern recognition system is configured to generate one or more output signals during use, and wherein the remote controller computer is further configured to process the one or more output signals from the pattern recognition system during use.

6117. The system of claim 6110, wherein at least one element of a first of the two or more measurement devices comprises at least one element of a second of the two or more measurement devices.

6118. The system of claim 6110, wherein the at least one additional property is selected from the group consisting of an index of refraction, a velocity of sound, a density, a critical dimension, and a profile of a layer or a feature formed on the specimen.

6119. The system of claim 6110, wherein the structure comprises a single layer formed on the specimen.

6120. The system of claim 6110, wherein the structure comprises a single layer formed on the specimen, and wherein the single layer is selected from the group consisting of a substantially transparent film, a semi-transparent film, and an opaque metal film.

6121. The system of claim 6110, wherein the structure comprises multiple layers formed on the specimen.

6122. The system of claim 6110, wherein the structure comprises multiple layers formed on the specimen, and wherein the multiple layers comprise two or more layers selected from the group consisting of a substantially transparent film, a semi-transparent film, an opaque metal film, and any combination thereof.

6123. The system of claim 6110, wherein the specimen comprises a blanket wafer.

6124. The system of claim 6110, wherein the specimen comprises a patterned wafer.

6125. The system of claim 6110, further comprising a handling robot configured to dispose the specimen on the stage, wherein the handling robot is coupled to the two or more measurement devices.

6126. The system of claim 6110, further comprising a power supply, wherein the power supply is coupled to the two measurement devices.

6127. The system of claim 6110, further comprising an autofocus mechanism, wherein the autofocus mechanism is configured to bring a specimen substantially into focus for the two or more measurement devices.

6128. The system of claim 6110, wherein the system is coupled to a chemical-mechanical polishing tool.

6129. The system of claim 6110, wherein the system is further configured to determine the at least two properties of the specimen substantially simultaneously during use.

6130. The system of claim 6110, wherein the two or more measurement devices are further configured to generate the one or more output signals in response to one or more of the at least two properties of the specimen at multiple locations on the surface of the specimen substantially simultaneously such that the one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

6131. The system of claim 6110, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to one or

more of the at least two properties of the specimen using a feedback control technique during use.

6132. The system of claim 6110, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties of the specimen using a feedforward control technique during use.

6133. The system of claim 6110, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

6134. The system of claim 6110, wherein the remote controller computer is coupled to a process tool, wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use, and wherein the remote controller computer is further configured to determine a relationship between one or more of the at least two properties and at least one of the monitored parameters during use.

6135. The system of claim 6110, wherein the remote controller computer is coupled to a process tool, wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use, wherein the remote controller computer is further configured to determine a relationship between one or more of the at least two properties and at least one of the monitored parameters during use, and wherein the remote controller computer is further configured to alter the parameter of at least one of the instruments in response to the relationship during use.

6136. The system of claim 6110, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, wherein the stage is further configured to support the specimen during a process step, and wherein the two or more measurement devices are configured to generate the one or more output signals during the process step.

6137. The system of claim 6110, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, wherein the stage is further configured to support the specimen during a process step, wherein the two or more measurement devices are configured to generate the one or more output signals during the process step, wherein the remote controller computer is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

6138. The system of claim 6110, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, wherein the stage is further configured to support the specimen during a process step, wherein the two or more measurement devices are configured to generate the one or more output signals during the process step, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to one or more of the at least two properties using an in situ control technique during use.

6139. The system of claim 6110, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

6140. The system of claim 6110, wherein a process tool comprises a first process chamber and a second process chamber, wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use, and wherein the system is further configured to determine one or more of the at least two properties of the specimen during said moving.

6141. The system of claim 6110, wherein the remote controller computer is further configured to compare one or more of the at least two properties of the specimen and properties of a plurality of specimens during use.

6142. The system of claim 6110, wherein the remote controller computer is further configured to compare one or more of the at least two properties of the specimen to a predetermined range for the one or more properties during use.

6143. The system of claim 6110, wherein the remote controller computer is further configured to compare one or more of the at least two properties of the specimen to a predetermined range for the one or more properties during use, wherein the remote controller computer is further configured to generate an output signal if one or more of the at least two properties of the specimen are outside of the predetermined range during use.

6144. The system of claim 6110, wherein the remote controller computer is further configured to alter a sampling frequency of at least one of the two or more measurement devices in response to one or more of the at least two properties of the specimen during use.

6145. The system of claim 6110, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to at least one of the

two or more measurement devices in response to one or more of the at least two properties using a feedback control technique during use.

6146. The system of claim 6110, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to at least one of the two or more measurement devices in response to one or more of the at least two properties using a feedforward control technique during use.

6147. The system of claim 6110, wherein the remote controller computer is further configured to generate a database during use, and wherein the database comprises the at least two properties of the specimen.

6148. The system of claim 6110, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least two properties of the specimen, and wherein the remote controller computer is further configured to calibrate the two or more measurement devices using the database during use.

6149. The system of claim 6110, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least two properties of the specimen, and wherein the remote controller computer is further configured to monitor output signals generated by the two or more measurement devices using the database during use.

6150. The system of claim 6110, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least two properties of the specimen and at least two properties of a plurality of specimens, wherein the at least two properties of the plurality of specimens are determined using a

plurality of measurement devices, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

6151. The system of claim 6110, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least two properties of the specimen and at least two properties of a plurality of specimens, wherein the at least two properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

6152. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to two or more measurement devices;

generating one or more output signals with the two or more measurement devices, wherein the one or more output signals are responsive to the at least two properties of the specimen; and

processing the one or more output signals to determine the at least two properties of the specimen, wherein the at least two properties of the specimen comprise a thickness of a structure on the specimen and at least one additional property of the specimen, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the two or more measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

6153. The method of claim 6152, further comprising laterally moving the stage while determining the at least two properties of the specimen.

6154. The method of claim 6152, further comprising rotatably moving the stage while determining the at least two properties of the specimen.

6155. The method of claim 6152, further comprising laterally and rotatably moving the stage while determining the at least two properties of the specimen.

6156. The method of claim 6152, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a grazing X-ray reflectometer.

6157. The method of claim 6152, wherein the two or more measurement devices comprise a small-spot photo-acoustic device and a broadband small-spot spectroscopic ellipsometer.

6158. The method of claim 6152, wherein the stage is further coupled to a pattern recognition system, the method further comprising generating one or more output signals

with the pattern recognition system and processing the one or more output signals from the pattern recognition system.

6159. The method of claim 6152, wherein at least one element of a first of the two or more measurement devices comprises at least one element of a second of the two or more measurement devices.

6160. The method of claim 6152, wherein the at least one additional property is selected from the group consisting of an index of refraction, a velocity of sound, a density, a critical dimension, and a profile of a layer or a feature formed on the specimen.

6161. The method of claim 6152, wherein the structure comprises a single layer formed on the specimen.

6162. The method of claim 6152, wherein the structure comprises a single layer formed on the specimen, and wherein the single layer is selected from the group consisting of a substantially transparent film, a semi-transparent film, and an opaque metal film.

6163. The method of claim 6152, wherein the structure comprises multiple layers formed on the specimen.

6164. The method of claim 6152, wherein the structure comprises multiple layers formed on the specimen, and wherein the multiple layers comprise two or more layers selected from the group consisting of a substantially transparent film, a semi-transparent film, an opaque metal film, and any combination thereof.

6165. The method of claim 6152, wherein the specimen comprises a blanket wafer.

6166. The method of claim 6152, wherein the specimen comprises a patterned wafer.

6167. The method of claim 6152, wherein disposing the specimen on the stage comprises disposing the specimen on the stage with a handling robot, wherein the handling robot is coupled to the two or more measurement devices.

6168. The method of claim 6152, further comprising bringing the specimen substantially into focus for the two or more measurement devices with an autofocus mechanism.

6169. The method of claim 6152, wherein the stage and the two or more measurement devices are coupled to a chemical-mechanical polishing tool.

6170. The method of claim 6152, further comprising generating the one or more output signals responsive to one or more of the at least two properties of the specimen at multiple locations on a surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

6171. The method of claim 6152, wherein the remote controller computer is further coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to one or more of the at least two properties of the specimen using a feedback control technique.

6172. The method of claim 6152, wherein the remote controller computer is further coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in

response to one or more of the at least two properties of the specimen using a feedforward control technique.

6173. The method of claim 6152, wherein the remote controller computer is further coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer.

6174. The method of claim 6152, wherein the remote controller computer is further coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer and determining a relationship between one or more of the at least two properties and at least one of the monitored parameters using the remote controller computer.

6175. The method of claim 6152, wherein the remote controller computer is further coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer, determining a relationship between one or more of the at least two properties and at least one of the monitored parameters using the remote controller computer, and altering a parameter of at least one of the instruments in response to the relationship using the remote controller computer.

6176. The method of claim 6152, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising determining the at least two properties of the specimen during the process step.

6177. The method of claim 6152, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising obtaining a signature characterizing the process step using the remote controller computer, wherein the signature comprises at least one singularity representative of an end of the process step.

6178. The method of claim 6152, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to one or more of the at least two properties using an in situ control technique.

6179. The method of claim 6152, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool, the method further comprising determining the at least two properties of the specimen during said detecting during said moving the specimen.

6180. The method of claim 6152, further comprising comparing one or more of the at least two properties of the specimen and properties of a plurality of specimens using the remote controller computer.

6181. The method of claim 6152, further comprising comparing one or more of the at least two properties of the specimen to a predetermined range for the one or more properties using the remote controller computer.

6182. The method of claim 6152, further comprising comparing one or more of the at least two properties of the specimen to a predetermined range for the one or more properties using the remote controller computer and generating an output signal using the remote controller computer if the one or more of the at least two properties of the specimen are outside of the predetermined range for the one or more properties.

6183. The method of claim 6152, wherein the remote controller computer is coupled to the two or more measurement devices, the method further comprising altering a sampling frequency of at least one of the two or more measurement devices using the remote controller computer in response to one or more of the at least two properties of the specimen.

6184. The method of claim 6152, wherein the remote controller computer is coupled to the two or more measurement devices, the method further comprising altering a parameter of one or more instruments coupled to at least one of the two or more measurement devices using the remote controller computer in response to one or more of the at least two properties of the specimen using a feedback control technique.

6185. The method of claim 6152, wherein the remote controller computer is coupled to the two or more measurement devices, the method further comprising altering a parameter of one or more instruments coupled to at least one of the two or more measurement devices using the remote controller computer in response to one or more of the at least two properties of the specimen using a feedforward control technique.

6186. The method of claim 6152, further comprising generating a database using the remote controller computer, wherein the database comprises the at least two properties of the specimen.

6187. The method of claim 6152, further comprising generating a database using the remote controller computer, wherein the database comprises the at least two properties of the specimen, the method further comprising calibrating the two or more measurement devices using the database and the remote controller computer.

6188. The method of claim 6152, further comprising generating a database using the remote controller computer, wherein the database comprises the at least two properties of the specimen, the method further comprising monitoring output signals of the two or more measurement devices using the remote controller computer.

6189. The method of claim 6152, further comprising generating a database using the remote controller computer, wherein the database comprises the at least two properties of the specimen at least two properties of a plurality of specimens, wherein the at least two properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the remote controller computer and the database.

6190. The method of claim 6152, further comprising generating a database using the remote controller computer, wherein the database comprises the at least two properties of the specimen at least two properties of a plurality of specimens, wherein the at least two properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the remote controller computer and the database.

6191. The method of claim 6152, further comprising sending the at least partially processed one or more output signals from a plurality of local processors to the remote controller computer, wherein each of the plurality of local processors is coupled to at least one of a plurality of measurement devices.

6192. A system configured to determine at least one property of a specimen during use, comprising:

a lithography track configured to perform one or more steps of a lithography process on the specimen during use;

a spectroscopic ellipsometer coupled to the lithography track, wherein the spectroscopic ellipsometer is configured to generate one or more output signals responsive to the at least one property of the specimen during use; and

a processor coupled to the spectroscopic ellipsometer, wherein the processor is configured to determine the at least one property of the specimen from the one or more output signals during use.

6193. The system of claim 6192, further comprising a stage coupled to the spectroscopic ellipsometer, wherein the stage is configured to move laterally during use.

6194. The system of claim 6192, further comprising a stage coupled to the spectroscopic ellipsometer, wherein the stage is configured to move rotatably during use.

6195. The system of claim 6192, further comprising a stage coupled to the spectroscopic ellipsometer, wherein the stage is configured to move laterally and rotatably during use.

6196. The system of claim 6192, wherein the at least one property is selected from the group consisting of a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a profile of a structure on the specimen.

6197. The system of claim 6192, further comprising an additional measurement device coupled to the lithography track, wherein the processor is further coupled to the additional measurement device, and wherein the processor is further configured to determine an additional property of the specimen from one or more output signals generated by the additional measurement device.

6198. The system of claim 6192, wherein the processor is further configured to determine an additional property of the specimen from the one or more output signals during use, and wherein the additional property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

6199. The system of claim 6192, wherein the processor is further configured to determine a presence of defects on the specimen from the one or more output signals during use.

6200. The system of claim 6192, wherein the processor is further configured to determine at least two properties of the specimen substantially simultaneously during use.

6201. The system of claim 6192, wherein the spectroscopic ellipsometer is further configured to image at least an area of the specimen onto a one-dimensional detector such that at least the one property of the specimen can be determined at multiple locations on the specimen substantially simultaneously.

6202. The system of claim 6192, wherein the spectroscopic ellipsometer is further configured to image at least an area of the specimen onto a two-dimensional detector such that at least the one property of the specimen can be determined at multiple locations substantially simultaneously.

6203. The system of claim 6192, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track.

6204. The system of claim 6192, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track, and wherein the spectroscopic ellipsometer is further configured to generate the one or more output signals during a resist apply process performed in the process chamber.

6205. The system of claim 6192, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track, and wherein the spectroscopic ellipsometer is further configured to generate the one or more output signals during a post apply bake process performed in the process chamber.

6206. The system of claim 6192, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track, and wherein the spectroscopic ellipsometer is further configured to generate the one or more output signals during a chill process performed in the process chamber.

6207. The system of claim 6192, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track, wherein the spectroscopic ellipsometer is further configured to generate the one or more output signals during a process step performed in the process chamber, and wherein the process step is performed subsequent to a develop process step.

6208. The system of claim 6192, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track, and wherein the spectroscopic

ellipsometer is further configured to generate the one or more output signals prior to an exposure step of the lithography process.

6209. The system of claim 6192, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track, wherein the spectroscopic ellipsometer is further configured to generate the one or more output signals subsequent to an exposure step of the lithography process, and wherein the at least one property of the specimen comprises at least one property of a latent image formed on the specimen by the exposure step.

6210. The system of claim 6192, wherein the spectroscopic ellipsometer is arranged laterally proximate to a process chamber of the lithography track.

6211. The system of claim 6192, wherein the spectroscopic ellipsometer is arranged laterally proximate to a process chamber of the lithography track, and wherein the lithography track comprises a wafer handler configured to move the specimen to a stage coupled to the spectroscopic ellipsometer during use.

6212. The system of claim 6192, wherein the spectroscopic ellipsometer is arranged laterally proximate to a process chamber of the lithography track, and wherein a stage coupled to the spectroscopic ellipsometer is configured to move the specimen from the spectroscopic ellipsometer to the lithography track during use.

6213. The system of claim 6192, wherein the spectroscopic ellipsometer is arranged laterally proximate to a process chamber of the lithography track, and wherein a stage coupled to the spectroscopic ellipsometer is configured to move the specimen to the process chamber of the lithography track during use.

6214. The system of claim 6192, wherein the system is further configured to determine at least the one property of the specimen while the specimen is waiting between the one or more steps of the lithography process.

6215. The system of claim 6192, wherein the lithography track comprises a support device configured to support the specimen during at least one of the one or more process steps, and wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6216. The system of claim 6192, wherein the lithography track comprises a support device configured to support the specimen during at least one of the one or more process steps, and wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6217. The system of claim 6192, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the lithography track.

6218. The system of claim 6192, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the lithography track.

6219. The system of claim 6192, wherein the spectroscopic ellipsometer is further coupled to a stage disposed within a process chamber of the lithography track, and wherein the stage is configured to support the specimen during at least one of the one or more process steps.

6220. The system of claim 6192, wherein the spectroscopic ellipsometer is further coupled to a stage disposed within a process chamber of the lithography track, and wherein the processor is further configured to determine at least the one property of the specimen during at least one of the one or more process steps.

6221. The system of claim 6192, wherein the spectroscopic ellipsometer is further coupled to a stage disposed within a process chamber of the lithography track, wherein the processor is further configured to obtain a signature characterizing at least one of the one or more process steps during use, and wherein the signature comprises at least one singularity representative of an end of the at least one of the one or more process steps.

6222. The system of claim 6192, wherein the spectroscopic ellipsometer is further coupled to a stage disposed within a process chamber of the lithography track, wherein the processor is further coupled to the lithography track, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the lithography track in response to the at least one property using an in situ control technique during use.

6223. The system of claim 6192, wherein the lithography track comprises a first process chamber and a second process chamber, wherein a stage coupled to the spectroscopic ellipsometer is configured to move the specimen from the first process chamber to the second process chamber during use, and wherein the spectroscopic ellipsometer is further configured to generate the one or more output signals as the stage is moving the specimen from the first process chamber to the second process chamber.

6224. The system of claim 6223, wherein the first process chamber is configured to chill the specimen during use, and wherein the second process chamber is configured to apply resist to the specimen during use.

6225. The system of claim 6223, wherein the first process chamber is configured to chill the specimen subsequent to a post apply bake process step during use, and wherein the second process chamber is configured to expose the specimen during use.

6226. The system of claim 6223, wherein the first process chamber is configured to expose the specimen during use, and wherein the second process chamber is configured to bake the specimen subsequent to exposure of the specimen during use.

6227. The system of claim 6223, wherein the first process chamber is configured to chill the specimen subsequent to a post exposure bake process step during use, and wherein the second process chamber is configured to develop the specimen during use.

6228. The system of claim 6223, wherein the first process chamber is configured to develop the specimen during use, and wherein the second process chamber is configured to bake the specimen subsequent to a develop process step during use.

6229. The system of claim 6223, wherein the first process chamber is configured to develop the specimen during use, and wherein the second process chamber is configured to receive the specimen in a wafer cassette during use.

6230. The system of claim 6192, wherein the processor is further configured to compare the at least one property of the specimen and properties of a plurality of specimens during use.

6231. The system of claim 6192, wherein the processor is further configured to compare the at least one property of the specimen to a predetermined range for the at least one property during use.

6232. The system of claim 6192, wherein the processor is further configured to compare the at least one property of the specimen to a predetermined range for the at least one property during use, and wherein the processor is further configured to generate an output signal if the at least one property is outside of the predetermined range for the at least one property during use.

6233. The system of claim 6192, wherein the processor is further configured to alter a sampling frequency of the spectroscopic ellipsometer in response to the at least one property during use.

6234. The system of claim 6192, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property using a feedback control technique during use.

6235. The system of claim 6192, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property using a feedforward control technique during use.

6236. The system of claim 6192, wherein the processor is further configured to generate a database during use, and wherein the database comprises the at least one property of the specimen.

6237. The system of claim 6192, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least one property of the specimen, and wherein the processor is further configured to calibrate the spectroscopic ellipsometer using the database during use.

6238. The system of claim 6192, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least one property of the specimen, and wherein the processor is further configured to monitor output signals generated by the spectroscopic ellipsometer using the database during use.

6239. The system of claim 6192, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least one property of the specimen and properties of a plurality of specimens, wherein the properties of the plurality of specimens are determined using a plurality of spectroscopic ellipsometers, wherein the processor is further coupled to the plurality of spectroscopic ellipsometers, and wherein the processor is further configured to calibrate the plurality of spectroscopic ellipsometers using the database during use.

6240. The system of claim 6192, wherein the processor is further configured to generate a database during use, wherein the database comprises the at least one property of the specimen and properties of a plurality of specimens, wherein the properties of the plurality of specimens are determined using a plurality of spectroscopic ellipsometers, wherein the processor is further coupled to the plurality of spectroscopic ellipsometers, and wherein the processor is further configured to monitor output signals generated by the plurality of spectroscopic ellipsometers using the database during use.

6241. The system of claim 6192, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

6242. The system of claim 6192, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to

be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

6243. The system of claim 6192, wherein the system is further configured to determine the at one property of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is further configured to alter at least one parameter of one or more instruments coupled to the lithography track in response to the at least one property of the specimen at the more than one position on the specimen to reduce within wafer variation of the at least one property.

6244. The system of claim 6192, wherein the processor is further coupled to the lithography track, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedback control technique during use.

6245. The system of claim 6192, wherein the processor is further coupled to the lithography track, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedforward control technique during use.

6246. The system of claim 6192, wherein the processor is further coupled to the lithography track, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the lithography track during use.

6247. The system of claim 6192, wherein the processor is further coupled to the lithography track, wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the lithography track during use, and wherein the

processor is further configured to determine a relationship between the at least one property and at least one of the monitored parameters during use.

6248. The system of claim 6192, wherein the processor is further coupled to the lithography track, wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the lithography track during use, wherein the processor is further configured to determine a relationship between the at least one property and at least one of the monitored parameters during use, and wherein the processor is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

6249. The system of claim 6192, wherein the processor comprises a local processor coupled to the spectroscopic ellipsometer and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

6250. The system of claim 6249, wherein the local processor is further configured to determine the at least one property during use.

6251. The system of claim 6249, wherein the remote controller computer is further configured to determine the property during use.

6252. A method for determining at least one property of a specimen, comprising:

processing the specimen with one or more steps of a lithography process in a lithography track;

generating one or more output signals responsive to the at least one property of the specimen with a spectroscopic ellipsometer, wherein the spectroscopic ellipsometer is coupled to the lithography track; and

processing the one or more output signals to determine the at least one property of the specimen.

6253. The method of claim 6252, wherein a stage is coupled to the spectroscopic ellipsometer, the method further comprising laterally moving the stage while determining the at least one property of the specimen.

6254. The method of claim 6252, wherein a stage is coupled to the spectroscopic ellipsometer, the method further comprising rotatably moving the stage while determining the at least one property of the specimen.

6255. The method of claim 6252, wherein a stage is coupled to the spectroscopic ellipsometer, the method further comprising laterally and rotatably moving the stage while determining the at least one property of the specimen.

6256. The method of claim 6252, wherein the at least one property is selected from the group consisting of a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a profile of a structure of the specimen.

6257. The method of claim 6252, comprising processing one or more output signals generated by an additional measurement device coupled to the lithography track to determine an additional property of the specimen.

6258. The method of claim 6252, further comprising processing the one or more output signals to determine an additional property of the specimen, wherein the additional property is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

6259. The method of claim 6252, further comprising processing the one or more output signals to determine a presence of defects on the specimen.

6260. The method of claim 6252, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two properties of the specimen substantially simultaneously.

6261. The method of claim 6252, further comprising imaging at least an area of the specimen onto a one-dimensional detector with the spectroscopic ellipsometer such that the at least one property of the specimen can be determined at multiple locations on the specimen substantially simultaneously.

6262. The method of claim 6252, further comprising imaging at least an area of the specimen onto a two-dimensional detector with the spectroscopic ellipsometer such that the at least one property of the specimen can be determined at multiple locations on the specimen substantially simultaneously.

6263. The method of claim 6252, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track.

6264. The method of claim 6252, further comprising generating the one or more output signals during a resist apply process performed in a process chamber of the lithography track.

6265. The method of claim 6252, further comprising generating the one or more output signals during a post apply bake process performed in a process chamber of the lithography track.

6266. The method of claim 6252, further comprising generating the one or more output signals during a chill process performed in a process chamber of the lithography track.

6267. The method of claim 6252, further comprising generating the one or more output signals during a process step performed in a process chamber of the lithography track, wherein the process step is performed subsequent to a develop process step of the lithography process.

6268. The method of claim 6252, further comprising generating the one or more output signals prior to an exposure step of the lithography process.

6269. The method of claim 6252, further comprising generating the one or more output signals subsequent to an exposure step of the lithography process, wherein the at least one property of the specimen comprises at least one property of a latent image formed on the specimen by the exposure step.

6270. The method of claim 6252, wherein the spectroscopic ellipsometer is arranged laterally proximate to a process chamber of the lithography track.

6271. The method of claim 6252, further comprising moving the specimen to a stage coupled to the spectroscopic ellipsometer with a wafer handler of the lithography track.

6272. The method of claim 6252, further comprising moving the specimen from the spectroscopic ellipsometer to the lithography track with a stage coupled to the spectroscopic ellipsometer.

6273. The method of claim 6252, further comprising moving the specimen to a process chamber of the lithography track with a stage coupled to the spectroscopic ellipsometer.

6274. The method of claim 6252, further comprising determining at least the one property of the specimen while the specimen is waiting between process steps.

6275. The method of claim 6252, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a support device of the lithography track, wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6276. The method of claim 6252, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a support device of the lithography track, wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6277. The method of claim 6252, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the lithography track.

6278. The method of claim 6252, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the lithography track.

6279. The method of claim 6252, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a stage coupled to the spectroscopic ellipsometer.

6280. The method of claim 6252, wherein processing the one or more output signals comprises determining the at least one property of the specimen during at least one of the one or more steps of the lithography process.

6281. The method of claim 6252, further comprising obtaining a signature characterizing at least one of the one or more steps of the lithography process, wherein the signature comprises at least one singularity representative of an end of the at least one step.

6282. The method of claim 6252, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using an in situ control technique.

6283. The method of claim 6252, wherein the lithography track comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the spectroscopic ellipsometer and generating the one or more output signals as the stage is moving the specimen from the first process chamber to the second process chamber.

6284. The method of claim 6283, further comprising chilling the specimen in the first process chamber and applying resist to the specimen in the second process chamber.

6285. The method of claim 6283, further comprising chilling the specimen in the first process chamber subsequent to a post apply bake process and exposing the specimen in the second process chamber.

6286. The method of claim 6283, further comprising exposing the specimen in the first process chamber and baking the specimen in the second process chamber.

6287. The method of claim 6283, further comprising chilling the specimen in the first process chamber subsequent to a post exposure bake process and developing the specimen in the second process chamber.

6288. The method of claim 6283, further comprising developing the specimen in the first process chamber and baking the specimen in the second process chamber.

6289. The method of claim 6283, further comprising developing the specimen in the first process chamber and receiving the specimen in a wafer cassette in the second process chamber.

6290. The method of claim 6252, further comprising comparing the at least one property of the specimen and properties of a plurality of specimens.

6291. The method of claim 6252, further comprising comparing the at least one property of the specimen to a predetermined range for the at least one property.

6292. The method of claim 6252, further comprising comparing the at least one property of the specimen to a predetermined range for the at least one property and generating an output signal if the at least one property is outside of the predetermined range.

6293. The method of claim 6252, further comprising altering a sampling frequency of the spectroscopic ellipsometer in response to the at least one property of the specimen.

6294. The method of claim 6252, further comprising altering a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property of the specimen using a feedback control technique.

6295. The method of claim 6252, further comprising altering a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property of the specimen using a feedforward control technique.

6296. The method of claim 6252, further comprising generating a database, wherein the database comprises the at least one property of the specimen.

6297. The method of claim 6252, further comprising generating a database comprising the at least one property of the specimen and calibrating the spectroscopic ellipsometer using the database.

6298. The method of claim 6252, further comprising generating a database comprising the at least one property of the specimen and monitoring output signals generated by the spectroscopic ellipsometer using the database.

6299. The method of claim 6252, further comprising generating a database comprising the at least one property of the specimen and properties of a plurality of specimens, wherein the properties of the plurality of specimens are generated using a plurality of spectroscopic ellipsometers, the method further comprising calibrating the plurality of spectroscopic ellipsometers using the database.

6300. The method of claim 6252, further comprising generating a database comprising the at least one property of the specimen and properties of a plurality of specimens, wherein the properties of the plurality of specimens are generated using a plurality of spectroscopic ellipsometers, the method further comprising monitoring output signals generated by the plurality of spectroscopic ellipsometers using the database.

6301. The method of claim 6252, further comprising calibrating a stand alone system with a calibration standard and calibrating the spectroscopic ellipsometer with the stand alone system.

6302. The method of claim 6252, further comprising calibrating a stand alone system with a calibration standard and calibrating the spectroscopic ellipsometer and at least one additional measurement device with the stand alone system.

6303. The method of claim 6252, further comprising determining the at least one property of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to the lithography track in response to the at least one property of the specimen at the more than one position on the specimen to reduce within wafer variation of the at least one property.

6304. The method of claim 6252, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedback control technique.

6305. The method of claim 6252, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedforward control technique.

6306. The method of claim 6252, further comprising monitoring a parameter of one or more instruments coupled to the lithography track.

6307. The method of claim 6252, further comprising monitoring a parameter of one or more instruments coupled to the lithography track and determining a relationship between the at least one property and at least one of the monitored parameters.

6308. The method of claim 6252, further comprising monitoring a parameter of one or more instruments coupled to the lithography track, determining a relationship between the at least one property and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

6309. The method of claim 6252, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the spectroscopic ellipsometer;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

6310. The method of claim 6309, wherein at least partially processing the one or more output signals comprises determining the at least one property.

6311. The method of claim 6309, wherein further processing the partially processed one or more output signals comprises determining the at least one property.

6312. A computer-implemented method for controlling a system configured to determine at least one property of a specimen during use, wherein the system comprises a spectroscopic ellipsometer, the method comprising:

controlling the spectroscopic ellipsometer to generate one or more output signals responsive to the at least one property of the specimen, wherein the spectroscopic ellipsometer is coupled to a lithography track, and wherein the lithography track is configured to perform one or more steps of a lithography process on the specimen during use;

processing the one or more output signals to determine the at least one property of the specimen.

6313. The method of claim 6312, further comprising supporting the specimen with a stage coupled to the spectroscopic ellipsometer and controlling the stage to move laterally while controlling the spectroscopic ellipsometer.

6314. The method of claim 6312, further comprising supporting the specimen with a stage coupled to the spectroscopic ellipsometer and controlling the stage to move rotatably while controlling the spectroscopic ellipsometer.

6315. The method of claim 6312, further comprising supporting the specimen with a stage coupled to the spectroscopic ellipsometer and controlling the stage to move laterally and rotatably while controlling the spectroscopic ellipsometer.

6316. The method of claim 6312, wherein the at least one property is selected from the group consisting of a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a profile of a structure on the specimen.

6317. The method of claim 6312, wherein the system further comprises an additional measurement device coupled to the lithography track, the method further comprising processing one or more output signals generated by the additional measurement device to determine an additional property of the specimen.

6318. The method of claim 6312, further comprising processing the one or more output signals to determine an additional property of the specimen, wherein the additional property is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

6319. The method of claim 6312, further comprising processing the one or more output signals to determine a presence of defects on the specimen.

6320. The method of claim 6312, wherein processing the one or more output signals comprises substantially simultaneously determining at least two properties of the specimen.

6321. The method of claim 6312, further comprising controlling the spectroscopic ellipsometer to image at least an area of the specimen onto a one-dimensional detector such that at least the one property of the specimen can be determined at multiple locations substantially simultaneously.

6322. The method of claim 6312, further comprising controlling the spectroscopic ellipsometer to image at least an area of the specimen onto a two-dimensional detector

such that at least the one property of the specimen can be determined at multiple location substantially simultaneously.

6323. The method of claim 6312, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track.

6324. The method of claim 6312, further comprising controlling the spectroscopic ellipsometer to generate the one or more output signals during a resist apply process performed in a process chamber of the lithography track.

6325. The method of claim 6312, further comprising controlling the spectroscopic ellipsometer to generate the one or more output signals during a post apply bake process performed in a process chamber of the lithography track.

6326. The method of claim 6312, further comprising controlling the spectroscopic ellipsometer to generate the one or more output signals during a chill process performed in a process chamber of the lithography track.

6327. The method of claim 6312, further comprising controlling the spectroscopic ellipsometer to generate the one or more output signals during a process step performed in a process chamber of the lithography track, wherein the process step is performed subsequent to a develop process step of the lithography process.

6328. The method of claim 6312, further comprising controlling the spectroscopic ellipsometer to generate the one or more output signals prior to an exposure step of the lithography process.

6329. The method of claim 6312, further comprising controlling the spectroscopic ellipsometer to generate the one or more output signals subsequent to an exposure step of the lithography process, and wherein the at least one property of the specimen comprises at least one property of a latent image formed on the specimen by the exposure step.

6330. The method of claim 6312, wherein the spectroscopic ellipsometer is arranged laterally proximate to a process chamber of the lithography track.

6331. The method of claim 6312, further comprising controlling a wafer handler coupled to the lithography track to move the specimen to a stage coupled to the spectroscopic ellipsometer.

6332. The method of claim 6312, further comprising controlling a stage coupled to the spectroscopic ellipsometer to move the specimen from the spectroscopic ellipsometer to the lithography track.

6333. The method of claim 6312, further comprising controlling a stage coupled to the spectroscopic ellipsometer to move the specimen to a process chamber of the lithography track.

6334. The method of claim 6312, the method further comprising controlling a wafer handler to move the specimen to a stage coupled to the spectroscopic ellipsometer such that at least the one property of the specimen can be determined while the specimen is waiting between process steps.

6335. The method of claim 6312, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a support device of the

lithography track, wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6336. The method of claim 6312, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a support device of the lithography track, wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6337. The method of claim 6312, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the lithography track.

6338. The method of claim 6312, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the lithography track.

6339. The method of claim 6312, further comprising controlling a stage coupled to the spectroscopic ellipsometer to support the specimen during at least one of the one or more steps of the lithography process.

6340. The method of claim 6312, further comprising processing the one or more output signals to determine the at least one property of the specimen during at least one of the one or more steps of the lithography process.

6341. The method of claim 6312, further comprising controlling the spectroscopic ellipsometer to obtain a signature characterizing at least one of the one or more steps of the lithography process, wherein the signature comprises at least one singularity representative of an end of the at least one of the one or more steps.

6342. The method of claim 6312, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using an in situ control technique.

6343. The method of claim 6312, wherein the lithography track comprises a first process chamber and a second process chamber, the method further comprising controlling a stage coupled to the spectroscopic ellipsometer to move the specimen from the first process chamber to the second process chamber and controlling the spectroscopic ellipsometer to generate the one or more output signals as the stage is moving the specimen from the first process chamber to the second process chamber.

6344. The method of claim 6343, further comprising chilling the specimen in the first process chamber and applying resist to the specimen in the second process chamber.

6345. The method of claim 6343, further comprising chilling the specimen in the first process chamber subsequent to a post apply bake process and exposing the specimen in the second process chamber.

6346. The method of claim 6343, further comprising exposing the specimen in the first process chamber and baking the specimen in the second process chamber.

6347. The method of claim 6343, further comprising chilling the specimen in the first process chamber subsequent to a post exposure bake process and developing the specimen in the second process chamber.

6348. The method of claim 6343, further comprising developing the specimen in the first process chamber and baking the specimen in the second process chamber.

6349. The method of claim 6343, further comprising developing the specimen in the first process chamber and receiving the specimen in a wafer cassette in the second process chamber.

6350. The method of claim 6312, further comprising comparing the at least one property of the specimen and properties of a plurality of specimens.

6351. The method of claim 6312, further comprising comparing the at least one property of the specimen to a predetermined range for the at least one property.

6352. The method of claim 6312, further comprising comparing the at least one property of the specimen to a predetermined range for the at least one property and generating an output signal if the at least one property is outside of the predetermined range.

6353. The method of claim 6312, further comprising altering a sampling frequency of the spectroscopic ellipsometer in response to the at least one property.

6354. The method of claim 6312, further comprising altering a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property using a feedback control technique.

6355. The method of claim 6312, further comprising altering a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property using a feedforward control technique.

6356. The method of claim 6312, further comprising generating a database, wherein the database comprises the at least one property.

6357. The method of claim 6312, further comprising generating a database, wherein the database comprises the at least one property, and calibrating the spectroscopic ellipsometer using the database.

6358. The method of claim 6312, further comprising generating a database, wherein the database comprises the at least one property, and monitoring output signals generated by the spectroscopic ellipsometer using the database.

6359. The method of claim 6312, further comprising generating a database, wherein the database comprises the at least one property and properties of a plurality of specimens, and wherein the properties of the plurality of specimens are generated using a plurality of spectroscopic ellipsometers, the method further comprising calibrating the plurality of spectroscopic ellipsometers using the database.

6360. The method of claim 6312, further comprising generating a database, wherein the database comprises the at least one property and properties of a plurality of specimens, and wherein the properties of the plurality of specimens are generated using a plurality of spectroscopic ellipsometers, the method further comprising monitoring output signals generated by the plurality of spectroscopic ellipsometers using the database.

6361. The method of claim 6312, further comprising controlling a stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

6362. The method of claim 6312, further comprising controlling a stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least one additional system.

6363. The method of claim 6312, wherein the system is further configured to determine the at least one property of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to the lithography track in response to the at least one property of the specimen at the more than one position on the specimen to reduce within wafer variation of the at least one property.

6364. The method of claim 6312, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedback control technique.

6365. The method of claim 6312, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedforward control technique.

6366. The method of claim 6312, further comprising monitoring a parameter of one or more instruments coupled to the lithography track.

6367. The method of claim 6312, further comprising monitoring a parameter of one or more instruments coupled to the lithography track and determining a relationship between the at least one property and at least one of the monitored parameters.

6368. The method of claim 6312, further comprising monitoring a parameter of one or more instruments coupled to the lithography track, determining a relationship between the at least one property and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

6369. The method of claim 6312, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the spectroscopic ellipsometer;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

6370. The method of claim 6369, wherein at least partially processing the one or more output signals comprises determining the at least one property.

6371. The method of claim 6369, wherein further processing the partially processed one or more output signals comprises determining the at least one property.

6372. A semiconductor device fabricated by a method, the method comprising:

processing the specimen with one or more steps of a lithography process in a lithography track to form a patterned resist on the specimen, wherein the patterned resist can be used to form at least a portion of the semiconductor device;

generating one or more output signals responsive to the at least one property of the specimen with a spectroscopic ellipsometer, wherein the spectroscopic ellipsometer is coupled to the lithography track; and

processing the one or more output signals to determine the at least one property of the specimen.

6373. The device of claim 6372, wherein a stage is coupled to the spectroscopic ellipsometer, the method further comprising laterally moving the stage while determining the at least one property of the specimen.

6374. The device of claim 6372, wherein a stage is coupled to the spectroscopic ellipsometer, the method further comprising rotatably moving the stage while determining the at least one property of the specimen.

6375. The device of claim 6372, wherein a stage is coupled to the spectroscopic ellipsometer, the method further comprising laterally and rotatably moving the stage while determining the at least one property of the specimen.

6376. The device of claim 6372, wherein the at least one property is selected from the group consisting of a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a profile of a structure of the specimen.

6377. The device of claim 6372, comprising processing one or more output signals generated by an additional measurement device coupled to the lithography track to determine an additional property of the specimen.

6378. The device of claim 6372, further comprising processing the one or more output signals to determine an additional property of the specimen, wherein the additional property is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

6379. The device of claim 6372, further comprising processing the one or more output signals to determine a presence of defects on the specimen.

6380. The device of claim 6372, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two properties of the specimen substantially simultaneously.

6381. The device of claim 6372, further comprising imaging at least an area of the specimen onto a one-dimensional detector with the spectroscopic ellipsometer such that the at least one property of the specimen can be determined at multiple locations on the specimen substantially simultaneously.

6382. The device of claim 6372, further comprising imaging at least an area of the specimen onto a two-dimensional detector with the spectroscopic ellipsometer such that the at least one property of the specimen can be determined at multiple locations on the specimen substantially simultaneously.

6383. The device of claim 6372, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track.

6384. The device of claim 6372, further comprising generating the one or more output signals during a resist apply process performed in a process chamber of the lithography track.

6385. The device of claim 6372, further comprising generating the one or more output signals during a post apply bake process performed in a process chamber of the lithography track.

6386. The device of claim 6372, further comprising generating the one or more output signals during a chill process performed in a process chamber of the lithography track.

6387. The device of claim 6372, further comprising generating the one or more output signals during a process step performed in a process chamber of the lithography track, wherein the process step is performed subsequent to a develop process step of the lithography process.

6388. The device of claim 6372, further comprising generating the one or more output signals prior to an exposure step of the lithography process.

6389. The device of claim 6372, further comprising generating the one or more output signals subsequent to an exposure step of the lithography process, wherein the at least one property of the specimen comprises at least one property of a latent image formed on the specimen by the exposure step.

6390. The device of claim 6372, wherein the spectroscopic ellipsometer is arranged laterally proximate to a process chamber of the lithography track.

6391. The device of claim 6372, further comprising moving the specimen to a stage coupled to the spectroscopic ellipsometer with a wafer handler of the lithography track.

6392. The device of claim 6372, further comprising moving the specimen from the spectroscopic ellipsometer to the lithography track with a stage coupled to the spectroscopic ellipsometer.

6393. The device of claim 6372, further comprising moving the specimen to a process chamber of the lithography track with a stage coupled to the spectroscopic ellipsometer.

6394. The device of claim 6372, further comprising determining at least the one property of the specimen while the specimen is waiting between process steps.

6395. The device of claim 6372, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a support device of the lithography track, wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6396. The device of claim 6372, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a support device of the lithography track, wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6397. The device of claim 6372, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the lithography track.

6398. The device of claim 6372, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the lithography track.

6399. The device of claim 6372, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a stage coupled to the spectroscopic ellipsometer.

6400. The device of claim 6372, wherein processing the one or more output signals comprises determining the at least one property of the specimen during at least one of the one or more steps of the lithography process.

6401. The device of claim 6372, further comprising obtaining a signature characterizing at least one of the one or more steps of the lithography process, wherein the signature comprises at least one singularity representative of an end of the at least one step.

6402. The device of claim 6372, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using an in situ control technique.

6403. The device of claim 6372, wherein the lithography track comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the spectroscopic ellipsometer and generating the one or more output signals as the stage is moving the specimen from the first process chamber to the second process chamber.

6404. The device of claim 6403, further comprising chilling the specimen in the first process chamber and applying resist to the specimen in the second process chamber.

6405. The device of claim 6403, further comprising chilling the specimen in the first process chamber subsequent to a post apply bake process and exposing the specimen in the second process chamber.

6406. The device of claim 6403, further comprising exposing the specimen in the first process chamber and baking the specimen in the second process chamber.

6407. The device of claim 6403, further comprising chilling the specimen in the first process chamber subsequent to a post exposure bake process and developing the specimen in the second process chamber.

6408. The device of claim 6403, further comprising developing the specimen in the first process chamber and baking the specimen in the second process chamber.

6409. The device of claim 6403, further comprising developing the specimen in the first process chamber and receiving the specimen in a wafer cassette in the second process chamber.

6410. The device of claim 6372, further comprising comparing the at least one property of the specimen and properties of a plurality of specimens.

6411. The device of claim 6372, further comprising comparing the at least one property of the specimen to a predetermined range for the at least one property.

6412. The device of claim 6372, further comprising comparing the at least one property of the specimen to a predetermined range for the at least one property and generating an output signal if the at least one property is outside of the predetermined range.

6413. The device of claim 6372, further comprising altering a sampling frequency of the spectroscopic ellipsometer in response to the at least one property of the specimen.

6414. The device of claim 6372, further comprising altering a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property of the specimen using a feedback control technique.

6415. The device of claim 6372, further comprising altering a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property of the specimen using a feedforward control technique.

6416. The device of claim 6372, further comprising generating a database, wherein the database comprises the at least one property of the specimen.

6417. The device of claim 6372, further comprising generating a database comprising the at least one property of the specimen and calibrating the spectroscopic ellipsometer using the database.

6418. The device of claim 6372, further comprising generating a database comprising the at least one property of the specimen and monitoring output signals generated by the spectroscopic ellipsometer using the database.

6419. The device of claim 6372, further comprising generating a database comprising the at least one property of the specimen and properties of a plurality of specimens, wherein the properties of the plurality of specimens are generated using a plurality of spectroscopic ellipsometers, the method further comprising calibrating the plurality of spectroscopic ellipsometers using the database.

6420. The device of claim 6372, further comprising generating a database comprising the at least one property of the specimen and properties of a plurality of specimens, wherein the properties of the plurality of specimens are generated using a plurality of spectroscopic ellipsometers, the method further comprising monitoring output signals generated by the plurality of spectroscopic ellipsometers using the database.

6421. The device of claim 6372, further comprising calibrating a stand alone system with a calibration standard and calibrating the spectroscopic ellipsometer with the stand alone system.

6422. The device of claim 6372, further comprising calibrating a stand alone system with a calibration standard and calibrating the spectroscopic ellipsometer and at least one additional measurement device with the stand alone system.

6423. The device of claim 6372, further comprising determining the at least one property of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to the lithography track in response to the at least one property of the specimen at the more than one position on the specimen to reduce within wafer variation of the at least one property.

6424. The device of claim 6372, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedback control technique.

6425. The device of claim 6372, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedforward control technique.

6426. The device of claim 6372, further comprising monitoring a parameter of one or more instruments coupled to the lithography track.

6427. The device of claim 6372, further comprising monitoring a parameter of one or more instruments coupled to the lithography track and determining a relationship between the at least one property and at least one of the monitored parameters.

6428. The device of claim 6372, further comprising monitoring a parameter of one or more instruments coupled to the lithography track, determining a relationship between the at least one property and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

6429. The device of claim 6372, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the spectroscopic ellipsometer;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

6430. The device of claim 6429, wherein at least partially processing the one or more output signals comprises determining the at least one property.

6431. The device of claim 6429, wherein further processing the partially processed one or more output signals comprises determining the at least one property.

6432. A method for fabricating a semiconductor device, comprising:

processing the specimen with one or more steps of a lithography process in a lithography track to form a patterned resist on the specimen, wherein the patterned resist can be used to form at least a portion of the semiconductor device;

generating one or more output signals responsive to the at least one property of the specimen with a spectroscopic ellipsometer, wherein the spectroscopic ellipsometer is coupled to the lithography track; and

processing the one or more output signals to determine the at least one property of the specimen.

6433. The method of claim 6432, wherein a stage is coupled to the spectroscopic ellipsometer, the method further comprising laterally moving the stage while determining the at least one property of the specimen.

6434. The method of claim 6432, wherein a stage is coupled to the spectroscopic ellipsometer, the method further comprising rotatably moving the stage while determining the at least one property of the specimen.

6435. The method of claim 6432, wherein a stage is coupled to the spectroscopic ellipsometer, the method further comprising laterally and rotatably moving the stage while determining the at least one property of the specimen.

6436. The method of claim 6432, wherein the at least one property is selected from the group consisting of a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a profile of a structure of the specimen.

6437. The method of claim 6432, comprising processing one or more output signals generated by an additional measurement device coupled to the lithography track to determine an additional property of the specimen.

6438. The method of claim 6432, further comprising processing the one or more output signals to determine an additional property of the specimen, wherein the additional property is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

6439. The method of claim 6432, further comprising processing the one or more output signals to determine a presence of defects on the specimen.

6440. The method of claim 6432, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two properties of the specimen substantially simultaneously.

6441. The method of claim 6432, further comprising imaging at least an area of the specimen onto a one-dimensional detector with the spectroscopic ellipsometer such that the at least one property of the specimen can be determined at multiple locations on the specimen substantially simultaneously.

6442. The method of claim 6432, further comprising imaging at least an area of the specimen onto a two-dimensional detector with the spectroscopic ellipsometer such that the at least one property of the specimen can be determined at multiple locations on the specimen substantially simultaneously.

6443. The method of claim 6432, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track.

6444. The method of claim 6432, further comprising generating the one or more output signals during a resist apply process performed in a process chamber of the lithography track.

6445. The method of claim 6432, further comprising generating the one or more output signals during a post apply bake process performed in a process chamber of the lithography track.

6446. The method of claim 6432, further comprising generating the one or more output signals during a chill process performed in a process chamber of the lithography track.

6447. The method of claim 6432, further comprising generating the one or more output signals during a process step performed in a process chamber of the lithography track, wherein the process step is performed subsequent to a develop process step of the lithography process.

6448. The method of claim 6432, further comprising generating the one or more output signals prior to an exposure step of the lithography process.

6449. The method of claim 6432, further comprising generating the one or more output signals subsequent to an exposure step of the lithography process, wherein the at least one property of the specimen comprises at least one property of a latent image formed on the specimen by the exposure step.

6450. The method of claim 6432, wherein the spectroscopic ellipsometer is arranged laterally proximate to a process chamber of the lithography track.

6451. The method of claim 6432, further comprising moving the specimen to a stage coupled to the spectroscopic ellipsometer with a wafer handler of the lithography track.

6452. The method of claim 6432, further comprising moving the specimen from the spectroscopic ellipsometer to the lithography track with a stage coupled to the spectroscopic ellipsometer.

6453. The method of claim 6432, further comprising moving the specimen to a process chamber of the lithography track with a stage coupled to the spectroscopic ellipsometer.

6454. The method of claim 6432, further comprising determining at least the one property of the specimen while the specimen is waiting between process steps.

6455. The method of claim 6432, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a support device of the lithography track, wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6456. The method of claim 6432, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a support device of the lithography track, wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6457. The method of claim 6432, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the lithography track.

6458. The method of claim 6432, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the lithography track.

6459. The method of claim 6432, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a stage coupled to the spectroscopic ellipsometer.

6460. The method of claim 6432, wherein processing the one or more output signals comprises determining the at least one property of the specimen during at least one of the one or more steps of the lithography process.

6461. The method of claim 6432, further comprising obtaining a signature characterizing at least one of the one or more steps of the lithography process, wherein the signature comprises at least one singularity representative of an end of the at least one step.

6462. The method of claim 6432, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using an in situ control technique.

6463. The method of claim 6432, wherein the lithography track comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the spectroscopic ellipsometer and generating the one or more output signals as the stage is moving the specimen from the first process chamber to the second process chamber.

6464. The method of claim 6463, further comprising chilling the specimen in the first process chamber and applying resist to the specimen in the second process chamber.

6465. The method of claim 6463, further comprising chilling the specimen in the first process chamber subsequent to a post apply bake process and exposing the specimen in the second process chamber.

6466. The method of claim 6463, further comprising exposing the specimen in the first process chamber and baking the specimen in the second process chamber.

6467. The method of claim 6463, further comprising chilling the specimen in the first process chamber subsequent to a post exposure bake process and developing the specimen in the second process chamber.

6468. The method of claim 6463, further comprising developing the specimen in the first process chamber and baking the specimen in the second process chamber.

6469. The method of claim 6463, further comprising developing the specimen in the first process chamber and receiving the specimen in a wafer cassette in the second process chamber.

6470. The method of claim 6432, further comprising comparing the at least one property of the specimen and properties of a plurality of specimens.

6471. The method of claim 6432, further comprising comparing the at least one property of the specimen to a predetermined range for the at least one property.

6472. The method of claim 6432, further comprising comparing the at least one property of the specimen to a predetermined range for the at least one property and generating an output signal if the at least one property is outside of the predetermined range.

6473. The method of claim 6432, further comprising altering a sampling frequency of the spectroscopic ellipsometer in response to the at least one property of the specimen.

6474. The method of claim 6432, further comprising altering a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property of the specimen using a feedback control technique.

6475. The method of claim 6432, further comprising altering a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property of the specimen using a feedforward control technique.

6476. The method of claim 6432, further comprising generating a database, wherein the database comprises the at least one property of the specimen.

6477. The method of claim 6432, further comprising generating a database comprising the at least one property of the specimen and calibrating the spectroscopic ellipsometer using the database.

6478. The method of claim 6432, further comprising generating a database comprising the at least one property of the specimen and monitoring output signals generated by the spectroscopic ellipsometer using the database.

6479. The method of claim 6432, further comprising generating a database comprising the at least one property of the specimen and properties of a plurality of specimens,

wherein the properties of the plurality of specimens are generated using a plurality of spectroscopic ellipsometers, the method further comprising calibrating the plurality of spectroscopic ellipsometers using the database.

6480. The method of claim 6432, further comprising generating a database comprising the at least one property of the specimen and properties of a plurality of specimens, wherein the properties of the plurality of specimens are generated using a plurality of spectroscopic ellipsometers, the method further comprising monitoring output signals generated by the plurality of spectroscopic ellipsometers using the database.

6481. The method of claim 6432, further comprising calibrating a stand alone system with a calibration standard and calibrating the spectroscopic ellipsometer with the stand alone system.

6482. The method of claim 6432, further comprising calibrating a stand alone system with a calibration standard and calibrating the spectroscopic ellipsometer and at least one additional measurement device with the stand alone system.

6483. The method of claim 6432, further comprising determining the at least one property of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to the lithography track in response to the at least one property of the specimen at the more than one position on the specimen to reduce within wafer variation of the at least one property.

6484. The method of claim 6432, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedback control technique.

6485. The method of claim 6432, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedforward control technique.

6486. The method of claim 6432, further comprising monitoring a parameter of one or more instruments coupled to the lithography track.

6487. The method of claim 6432, further comprising monitoring a parameter of one or more instruments coupled to the lithography track and determining a relationship between the at least one property and at least one of the monitored parameters.

6488. The method of claim 6432, further comprising monitoring a parameter of one or more instruments coupled to the lithography track, determining a relationship between the at least one property and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

6489. The method of claim 6432, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the spectroscopic ellipsometer;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

6490. The method of claim 6489, wherein at least partially processing the one or more output signals comprises determining the at least one property.

6491. The method of claim 6489, wherein further processing the partially processed one or more output signals comprises determining the at least one property.

6492. A system configured to determine at least one property of a specimen during use, comprising:

a lithography track configured to perform one or more steps of a lithography process on the specimen during use;

a spectroscopic ellipsometer coupled to the lithography track, wherein the spectroscopic ellipsometer is configured to generate one or more output signals responsive to the at least one property of the specimen during use;

a local processor coupled to the spectroscopic ellipsometer, wherein the local processor is configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to further process the one or more output signals to determine the at least one property of the specimen during use.

6493. The system of claim 6492, further comprising a stage coupled to the spectroscopic ellipsometer, wherein the stage is configured to move laterally during use.

6494. The system of claim 6492, further comprising a stage coupled to the spectroscopic ellipsometer, wherein the stage is configured to move rotatably during use.

6495. The system of claim 6492, further comprising a stage coupled to the spectroscopic ellipsometer, wherein the stage is configured to move laterally and rotatably during use.

6496. The system of claim 6492, wherein the at least one property is selected from the group consisting of a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a profile of a structure on the specimen.

6497. The system of claim 6492, further comprising an additional measurement device coupled to the lithography track, wherein the local processor is further coupled to the additional measurement device, and wherein the remote controller computer is further configured to determine an additional property of the specimen from one or more output signals generated by the additional measurement device.

6498. The system of claim 6492, wherein the remote controller computer is further configured to determine a presence of defects on the specimen from the one or more output signals during use.

6499. The system of claim 6492, wherein the remote controller computer is further configured to determine at least two properties of the specimen substantially simultaneously during use.

6500. The system of claim 6492, wherein the spectroscopic ellipsometer is further configured to image at least an area of the specimen onto a one-dimensional detector such

that at least the one property of the specimen can be determined at multiple locations on the specimen substantially simultaneously.

6501. The system of claim 6492, wherein the spectroscopic ellipsometer is further configured to image at least an area of the specimen onto a two-dimensional detector such that at least the one property of the specimen can be determined at multiple locations on the specimen substantially simultaneously.

6502. The system of claim 6492, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track.

6503. The system of claim 6492, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track, and wherein the spectroscopic ellipsometer is further configured to generate the one or more output signals during a resist apply process performed in the process chamber.

6504. The system of claim 6492, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track, and wherein the spectroscopic ellipsometer is further configured to generate the one or more output signals during a post apply bake process performed in the process chamber.

6505. The system of claim 6492, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track, and wherein the spectroscopic ellipsometer is further configured to generate the one or more output signals during a chill process performed in the process chamber.

6506. The system of claim 6492, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track, and wherein the spectroscopic

ellipsometer is further configured to generate the one or more output signals during a process step performed in the process chamber, and wherein the process step is preformed subsequent to a develop process step of the lithography process.

6507. The system of claim 6492, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track, and wherein the spectroscopic ellipsometer is further configured to generate the one or more output signals prior to an exposure step of the lithography process.

6508. The system of claim 6492, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track, and wherein the spectroscopic ellipsometer is further configured to generate the one or more output signals subsequent to an exposure step of the lithography process, and wherein the at least one property of the specimen comprises at least one property of a latent image formed on the specimen by the exposure step.

6509. The system of claim 6492, wherein the spectroscopic ellipsometer is arranged laterally proximate to a process chamber of the lithography track.

6510. The system of claim 6492, wherein the spectroscopic ellipsometer is arranged laterally proximate to a process chamber of the lithography track, and wherein the lithography track comprises a wafer handler configured to move the specimen to a stage coupled to the spectroscopic ellipsometer during use.

6511. The system of claim 6492, wherein the spectroscopic ellipsometer is arranged laterally proximate to a process chamber of the lithography track, and wherein a stage coupled to the spectroscopic ellipsometer is configured to move the specimen from the spectroscopic ellipsometer to the lithography track during use.

6512. The system of claim 6492, wherein the spectroscopic ellipsometer is arranged laterally proximate to a process chamber of the lithography track, and wherein a stage coupled to the spectroscopic ellipsometer is configured to move the specimen to the process chamber of the lithography track during use.

6513. The system of claim 6492, wherein the system is further configured to determine at least the one property of the specimen while the specimen is waiting between the one or more steps of the lithography process.

6514. The system of claim 6492, wherein the lithography track comprises a support device configured to support the specimen during at least one of the one or more process steps, and wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6515. The system of claim 6492, wherein the lithography track comprises a support device configured to support the specimen during at least one of the one or more process steps, and wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6516. The system of claim 6492, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the lithography track.

6517. The system of claim 6492, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the lithography track.

6518. The system of claim 6492, wherein the spectroscopic ellipsometer is further coupled to a stage disposed within a process chamber of the lithography track, and wherein the stage is configured to support the specimen during at least one of the one or more process steps.

6519. The system of claim 6492, wherein the spectroscopic ellipsometer is further coupled to a stage disposed within a process chamber of the lithography track, and wherein the remote controller computer is further configured to determine at least the one property of the specimen during at least one of the one or more process steps.

6520. The system of claim 6492, wherein the spectroscopic ellipsometer is further coupled to a stage disposed within a process chamber of the lithography track, wherein the remote controller computer is further configured to obtain a signature characterizing at least one of the one or more process steps during use, and wherein the signature comprises at least one singularity representative of an end of the at least one of the one or more process steps.

6521. The system of claim 6492, wherein the spectroscopic ellipsometer is further coupled to a stage disposed within a process chamber of the lithography track, wherein the remote controller computer is further coupled to the lithography track, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the lithography track in response to the at least one property using an in situ control technique during use.

6522. The system of claim 6492, wherein the lithography track comprises a first process chamber and a second process chamber, wherein a stage coupled to the spectroscopic ellipsometer is configured to move the specimen from the first process chamber to the second process chamber during use, and wherein the spectroscopic ellipsometer is further

configured to generate the one or more output signals as the stage is moving the specimen from the first process chamber to the second process chamber.

6523. The system of claim 6522, wherein the first process chamber is configured to chill the specimen during use, and wherein the second process chamber is configured to apply resist to the specimen during use.

6524. The system of claim 6522, wherein the first process chamber is configured to chill the specimen subsequent to a post apply bake process step during use, and wherein the second process chamber is configured to expose the specimen during use.

6525. The system of claim 6522, wherein the first process chamber is configured to expose the specimen during use, and wherein the second process chamber is configured to bake the specimen subsequent to exposure of the specimen during use.

6526. The system of claim 6522, wherein the first process chamber is configured to chill the specimen subsequent to a post exposure bake process step during use, and wherein the second process chamber is configured to develop the specimen during use.

6527. The system of claim 6522, wherein the first process chamber is configured to develop the specimen during use, and wherein the second process chamber is configured to bake the specimen subsequent to a develop process step during use.

6528. The system of claim 6522, wherein the first process chamber is configured to develop the specimen during use, and wherein the second process chamber is configured to receive the specimen in a wafer cassette during use.

6529. The system of claim 6492, wherein the remote controller computer is further configured to compare the at least one property of the specimen and properties of a plurality of specimens during use.

6530. The system of claim 6492, wherein the remote controller computer is further configured to compare the at least one property of the specimen to a predetermined range for the at least one property during use.

6531. The system of claim 6492, wherein the remote controller computer is further configured to compare the at least one property of the specimen to a predetermined range for the at least one property during use, and wherein the remote controller computer is further configured to generate an output signal if the at least one property is outside of the predetermined range for the at least one property during use.

6532. The system of claim 6492, wherein the remote controller computer is further configured to alter a sampling frequency of the spectroscopic ellipsometer in response to the at least one property during use.

6533. The system of claim 6492, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property using a feedback control technique during use.

6534. The system of claim 6492, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property using a feedforward control technique during use.

6535. The system of claim 6492, wherein the remote controller computer is further configured to generate a database during use, and wherein the database comprises the at least one property of the specimen.

6536. The system of claim 6492, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least one property of the specimen, and wherein the remote controller computer is further configured to calibrate the spectroscopic ellipsometer using the database during use.

6537. The system of claim 6492, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least one property of the specimen, and wherein the remote controller computer is further configured to monitor output signals generated by the spectroscopic ellipsometer using the database during use.

6538. The system of claim 6492, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least one property of the specimen and properties of a plurality of specimens, wherein the properties of the plurality of specimens are determined using a plurality of spectroscopic ellipsometers, wherein the remote controller computer is further coupled to the plurality of spectroscopic ellipsometers, and wherein the remote controller computer is further configured to calibrate the plurality of spectroscopic ellipsometers using the database during use.

6539. The system of claim 6492, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the at least one property of the specimen and properties of a plurality of specimens, wherein the properties of the plurality of specimens are determined using a plurality of spectroscopic

ellipsometers, wherein the remote controller computer is further coupled to the plurality of spectroscopic ellipsometers, and wherein the remote controller computer is further configured to monitor output signals generated by the plurality of spectroscopic ellipsometers using the database during use.

6540. The system of claim 6492, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

6541. The system of claim 6492, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

6542. The system of claim 6492, wherein the system is further configured to determine the at one property of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the remote controller computer is further configured to alter at least one parameter of one or more instruments coupled to the lithography track in response to the at least one property of the specimen at the more than one position on the specimen to reduce within wafer variation of the at least one property.

6543. The system of claim 6492, wherein the remote controller computer is further coupled to the lithography track, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedback control technique during use.

6544. The system of claim 6492, wherein the remote controller computer is further coupled to the lithography track, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedforward control technique during use.

6545. The system of claim 6492, wherein the remote controller computer is further coupled to the lithography track, and wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the lithography track during use.

6546. The system of claim 6492, wherein the remote controller computer is further coupled to the lithography track, wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the lithography track during use, and wherein the remote controller computer is further configured to determine a relationship between the at least one property and at least one of the monitored parameters during use.

6547. The system of claim 6492, wherein the remote controller computer is further coupled to the lithography track, wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the lithography track during use, wherein the remote controller computer is further configured to determine a relationship between the at least one property and at least one of the monitored parameters during use, and wherein the remote controller computer is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

6548. A method for determining at least one property of a specimen, comprising:

performing one or more steps of a lithography process on the specimen in a lithography track;

generating one or more output signals responsive to the at last one property of the specimen with a spectroscopic ellipsometer, wherein the spectroscopic ellipsometer is coupled to the lithography track; and

processing the one or more output signals to determine the at least one property of the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the spectroscopic ellipsometer;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

6549. The method of claim 6548, wherein a stage is coupled to the spectroscopic ellipsometer, the method further comprising laterally moving the stage while determining the at least one property of the specimen.

6550. The method of claim 6548, wherein a stage is coupled to the spectroscopic ellipsometer, the method further comprising rotatably moving the stage while determining the at least one property of the specimen.

6551. The method of claim 6548, wherein a stage is coupled to the spectroscopic ellipsometer, the method further comprising laterally and rotatably moving the stage while determining the at least one property of the specimen.

6552. The method of claim 6548, wherein the at least one property is selected from the group consisting of a thickness, an index of refraction, an extinction coefficient, a critical dimension, and a profile of a structure of the specimen.

6553. The method of claim 6548, comprising processing one or more output signals generated by an additional measurement device coupled to the lithography track to determine an additional property of the specimen.

6554. The method of claim 6548, further comprising processing the one or more output signals to determine an additional property of the specimen, wherein the additional property is selected from the group consisting of a roughness of the specimen, a roughness of the layer on the specimen, and a roughness of a feature of the specimen.

6555. The method of claim 6548, further comprising processing the one or more output signals to determine a presence of defects on the specimen.

6556. The method of claim 6548, wherein processing the one or more output signals comprises processing the one or more output signals to determine at least two properties of the specimen substantially simultaneously.

6557. The method of claim 6548, further comprising imaging at least an area of the specimen onto a one-dimensional detector with the spectroscopic ellipsometer such that the at least one property of the specimen can be determined at multiple locations on the specimen substantially simultaneously.

6558. The method of claim 6548, further comprising imaging at least an area of the specimen onto a two-dimensional detector with the spectroscopic ellipsometer such that the at least one property of the specimen can be determined at multiple locations on the specimen substantially simultaneously.

6559. The method of claim 6548, wherein the spectroscopic ellipsometer is further coupled to a process chamber of the lithography track.

6560. The method of claim 6548, further comprising generating the one or more output signals during a resist apply process performed in a process chamber of the lithography track.

6561. The method of claim 6548, further comprising generating the one or more output signals during a post apply bake process performed in a process chamber of the lithography track.

6562. The method of claim 6548, further comprising generating the one or more output signals during a chill process performed in a process chamber of the lithography track.

6563. The method of claim 6548, further comprising generating the one or more output signals during a process step performed in a process chamber of the lithography track, wherein the process step is performed subsequent to a develop process step of the lithography process.

6564. The method of claim 6548, further comprising generating the one or more output signals prior to an exposure step of the lithography process.

6565. The method of claim 6548, further comprising generating the one or more output signals subsequent to an exposure step of the lithography process, wherein the at least one property of the specimen comprises at least one property of a latent image formed on the specimen by the exposure step.

6566. The method of claim 6548, wherein the spectroscopic ellipsometer is arranged laterally proximate to a process chamber of the lithography track.

6567. The method of claim 6548, further comprising moving the specimen to a stage coupled to the spectroscopic ellipsometer with a wafer handler of the lithography track.

6568. The method of claim 6548, further comprising moving the specimen from the spectroscopic ellipsometer to the lithography track with a stage coupled to the spectroscopic ellipsometer.

6569. The method of claim 6548, further comprising moving the specimen to a process chamber of the lithography track with a stage coupled to the spectroscopic ellipsometer.

6570. The method of claim 6548, further comprising determining at least the one property of the specimen while the specimen is waiting between process steps.

6571. The method of claim 6548, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a support device of the

lithography track, wherein an upper surface of the support device is substantially parallel to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6572. The method of claim 6548, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a support device of the lithography track, wherein an upper surface of the support device is substantially perpendicular to an upper surface of a stage coupled to the spectroscopic ellipsometer.

6573. The method of claim 6548, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the lithography track.

6574. The method of claim 6548, wherein the spectroscopic ellipsometer is disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the lithography track.

6575. The method of claim 6548, further comprising supporting the specimen during at least one of the one or more steps of the lithography process with a stage coupled to the spectroscopic ellipsometer.

6576. The method of claim 6548, wherein processing the one or more output signals comprises determining the at least one property of the specimen during at least one of the one or more steps of the lithography process.

6577. The method of claim 6548, further comprising obtaining a signature characterizing at least one of the one or more steps of the lithography process, wherein the signature comprises at least one singularity representative of an end of the at least one step.

6578. The method of claim 6548, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using an in situ control technique.

6579. The method of claim 6548, wherein the lithography track comprises a first process chamber and a second process chamber, the method further comprising moving the specimen from the first process chamber to the second process chamber using a stage coupled to the spectroscopic ellipsometer and generating the one or more output signals as the stage is moving the specimen from the first process chamber to the second process chamber.

6580. The method of claim 6579, further comprising chilling the specimen in the first process chamber and applying resist to the specimen in the second process chamber.

6581. The method of claim 6579, further comprising chilling the specimen in the first process chamber subsequent to a post apply bake process and exposing the specimen in the second process chamber.

6582. The method of claim 6579, further comprising exposing the specimen in the first process chamber and baking the specimen in the second process chamber.

6583. The method of claim 6579, further comprising chilling the specimen in the first process chamber subsequent to a post exposure bake process and developing the specimen in the second process chamber.

6584. The method of claim 6579, further comprising developing the specimen in the first process chamber and baking the specimen in the second process chamber.

6585. The method of claim 6579, further comprising developing the specimen in the first process chamber and receiving the specimen in a wafer cassette in the second process chamber.

6586. The method of claim 6548, further comprising comparing the at least one property of the specimen and properties of a plurality of specimens.

6587. The method of claim 6548, further comprising comparing the at least one property of the specimen to a predetermined range for the at least one property.

6588. The method of claim 6548, further comprising comparing the at least one property of the specimen to a predetermined range for the at least one property and generating an output signal if the at least one property is outside of the predetermined range.

6589. The method of claim 6548, further comprising altering a sampling frequency of the spectroscopic ellipsometer in response to the at least one property of the specimen.

6590. The method of claim 6548, further comprising altering a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property of the specimen using a feedback control technique.

6591. The method of claim 6548, further comprising altering a parameter of one or more instruments coupled to the spectroscopic ellipsometer in response to the at least one property of the specimen using a feedforward control technique.

6592. The method of claim 6548, further comprising generating a database, wherein the database comprises the at least one property of the specimen.

6593. The method of claim 6548, further comprising generating a database comprising the at least one property of the specimen and calibrating the spectroscopic ellipsometer using the database.

6594. The method of claim 6548, further comprising generating a database comprising the at least one property of the specimen and monitoring output signals generated by the spectroscopic ellipsometer using the database.

6595. The method of claim 6548, further comprising generating a database comprising the at least one property of the specimen and properties of a plurality of specimens, wherein the properties of the plurality of specimens are generated using a plurality of spectroscopic ellipsometers, the method further comprising calibrating the plurality of spectroscopic ellipsometers using the database.

6596. The method of claim 6548, further comprising generating a database comprising the at least one property of the specimen and properties of a plurality of specimens, wherein the properties of the plurality of specimens are generated using a plurality of spectroscopic ellipsometers, the method further comprising monitoring output signals generated by the plurality of spectroscopic ellipsometers using the database.

6597. The method of claim 6548, further comprising calibrating a stand alone system with a calibration standard and calibrating the spectroscopic ellipsometer with the stand alone system.

6598. The method of claim 6548, further comprising calibrating a stand alone system with a calibration standard and calibrating the spectroscopic ellipsometer and at least one additional measurement device with the stand alone system.

6599. The method of claim 6548, further comprising determining the at least one property of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to the lithography track in response to the at least one property of the specimen at the more than one position on the specimen to reduce within wafer variation of the at least one property.

6600. The method of claim 6548, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedback control technique.

6601. The method of claim 6548, further comprising altering a parameter of one or more instruments coupled to the lithography track in response to the at least one property using a feedforward control technique.

6602. The method of claim 6548, further comprising monitoring a parameter of one or more instruments coupled to the lithography track.

6603. The method of claim 6548, further comprising monitoring a parameter of one or more instruments coupled to the lithography track and determining a relationship between the at least one property and at least one of the monitored parameters.

6604. The method of claim 6548, further comprising monitoring a parameter of one or more instruments coupled to the lithography track, determining a relationship between the at least one property and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

6605. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals in response to the detected energy during use; and

a processor coupled to the measurement device and configured to determine the at least two properties of the specimen from the one or more output signals during use.

6606. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and processing the one or more output signals to determine the at least two properties of the specimen.

6607. A computer-implemented method for controlling a system configured to determine at least two properties of a specimen during use, wherein the system comprises a measurement device, comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, and wherein the measurement device is coupled to a stage, comprising:

controlling the illumination system to direct energy toward a surface of the specimen;

controlling the detection system to detect energy propagating from the surface of the specimen; and

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine the at least two properties of the specimen.

6608. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system; detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and processing the one or more output signals to determine the at least two properties of the portion of the semiconductor device.

6609. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system; detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine the at least two properties of the portion of the semiconductor device.

6610. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals in response to the detected energy during use;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine the at least two properties of the specimen from the at least partially processed one or more output signals during use.

6611. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system; detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals in response to the detected energy; and processing the one or more output signals to determine the at least two properties of the specimen, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

6612. A system configured to determine at least one property of a specimen during use, comprising:

a process tool configured to process the specimen during use;

a measurement device coupled to the process tool, comprising:

an illumination system configured to direct energy toward the surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals in response to the detected energy during use; and

a processor coupled to the measurement device and configured to determine the at least one property of the specimen from the one or more output signals during use.

6613. A method for determining at least one property of a specimen, comprising:

processing the specimen in a process tool;

directing energy toward a surface of the specimen using an illumination system;

detecting energy propagating from the surface of the specimen using a detection system, wherein illumination system and the detection system comprises a measurement device, and wherein the measurement device is coupled to the process tool;

generating one or more output signals responsive to the detected energy; and processing the one or more output signals to determine the at least one property of the specimen.

6614. A computer-implemented method for controlling a system configured to determine at least one property of a specimen during use, wherein the system comprises a measurement device coupled to a process tool, and wherein the process tool is configured to process the specimen during use, the method comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, comprising:

controlling the illumination system to direct energy toward a surface of the specimen during use;

controlling the detection system to detect energy propagating from the surface of the specimen during use; and

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine the at least one property of the specimen.

6615. A semiconductor device fabricated by a method, the method comprising:

processing a specimen in a process tool to perform at least a step of a process on the specimen;

directing energy toward a surface of the specimen using an illumination system;

detecting energy propagating from the surface of the specimen using a detection system, wherein illumination system and the detection system comprises a measurement device, and wherein the measurement device is coupled to the process tool;

generating one or more output signals responsive to the detected energy; and processing the one or more output signals to determine at least the one property of the specimen.

6616. A method for fabricating a semiconductor device, comprising:

processing a specimen in a process tool to perform at least a step of a process on the specimen;

directing energy toward a surface of the specimen using an illumination system;

detecting energy propagating from the surface of the specimen using a detection system, wherein illumination system and the detection system comprises a measurement device, and wherein the measurement device is coupled to the process tool;

generating one or more output signals responsive to the detected energy; and processing the one or more output signals to determine at least the one property of the specimen.

6617. A system configured to determine at least one property of a specimen during use, comprising:

a process tool configured to process the specimen during use;

a measurement device coupled to the process tool, comprising:

an illumination system configured to direct energy toward the surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals in response to the detected energy during use; and

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine the at least one property of the specimen from the at least partially processed one or more output signals.

6618. A method for determining at least one property of a specimen, comprising:

processing the specimen in a process tool;

directing energy toward a surface of the specimen using an illumination system;

detecting energy propagating from the surface of the specimen using a detection system, wherein the illumination system and the detection system comprises a

measurement device, and wherein the measurement device is coupled to the process tool;

generating one or more output signals responsive to the detected energy; and processing the one or more output signals to determine at least the one property of the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

6619. A system configured to determine at least two properties of a specimen during use, comprising:

two or more measurement devices, wherein the two or more measurement devices are configured to generate one or more output signals responsive to one or more of the at least two properties of the specimen during use; and

a processor coupled to the two or more measurement devices, wherein the processor is configured to determine the at least two properties of the specimen from the one or more output signals during use.

6620. A method for determining at least two properties of a specimen, comprising:

generating one or more output signals with two or more measurement devices, wherein the one or more output signals are responsive to one or more of the at least two properties of the specimen; and

processing the one or more output signals to determine the at least two properties of the specimen.

6621. A computer-implemented method for controlling a system configured to determine at least two properties of a specimen during use, wherein the system comprises two or more measurement devices, comprising:

controlling the two or more measurement devices to generate one or more output signals responsive to one or more of the at least two properties of the specimen; and

processing the one or more output signals to determine the at least two properties of the specimen.

6622. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

generating one or more output signals with two or more measurement devices, wherein the one or more output signals are responsive to one or more of at least two properties of the specimen; and

processing the one or more output signals to determine the at least two properties of the specimen.

6623. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

generating one or more output signals with two or more measurement devices, wherein the one or more output signals are responsive to one or more of at least two properties of the specimen; and

processing the one or more output signals to determine the at least two properties of the specimen.

6624. A system configured to determine at least two properties of a specimen during use, comprising:

two or more measurement devices, wherein the two or more measurement devices are configured to generate one or more output signals responsive to one or more of the at least two properties of the specimen;

a local processor coupled to the two or more measurement devices, wherein the local processor is configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or

more output signals during use and to determine the at least two properties of the specimen during use.

6625. A method for determining at least two properties of a specimen, comprising:

generating one or more output signals with two or more measurement devices, wherein the one or more output signals are responsive to one or more of the at least two properties of the specimen; and

processing the one or more output signals to determine the at least two properties of the specimen, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the two or more measurement devices;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

6626. A system configured to determine at least one property of a specimen during use, comprising:

a lithography track configured to perform one or more steps of a lithography process on the specimen during use;

a measurement device coupled to the lithography track, wherein the measurement device is configured to generate one or more output signals responsive to the at least one property of the specimen during use; and

a processor coupled to the measurement device, wherein the processor is configured to determine the at least one property of the specimen from the one or more output signals during use.

6627. A method for determining at least one property of a specimen, comprising:

processing the specimen with one or more steps of a lithography process in a lithography track;

generating one or more output signals responsive to the at least one property of the specimen with a measurement device, wherein the measurement device is coupled to the lithography track; and

processing the one or more output signals to determine the at least one property of the specimen.

6628. A computer-implemented method for controlling a system configured to determine at least one property of a specimen during use, wherein the system comprises a measurement device, the method comprising:

controlling the measurement device to generate one or more output signals responsive to the at least one property of the specimen, wherein the measurement device is coupled to a lithography track, and wherein the lithography track is

configured to perform one or more steps of a lithography process on the specimen during use; and

processing the one or more output signals to determine the at least one property of the specimen.

6629. A semiconductor device fabricated by a method, the method comprising:

processing the specimen with one or more steps of a lithography process in a lithography track to form a patterned resist on the specimen, wherein the patterned resist can be used to form at least a portion of the semiconductor device;

generating one or more output signals responsive to the at least one property of the specimen with a measurement device, wherein the measurement device is coupled to the lithography track; and

processing the one or more output signals to determine the at least one property of the specimen.

6630. A method for fabricating a semiconductor device, comprising:

processing the specimen with one or more steps of a lithography process in a lithography track to form a patterned resist on the specimen, wherein the patterned resist can be used to form at least a portion of the semiconductor device;

generating one or more output signals responsive to the at least one property of the specimen with a measurement device, wherein the measurement device is coupled to the lithography track; and

processing the one or more output signals to determine the at least one property of the specimen.

6631. A system configured to determine at least one property of a specimen during use, comprising:

a lithography track configured to perform one or more steps of a lithography process on the specimen during use;

a measurement device coupled to the lithography track, wherein the measurement device is configured to generate one or more output signals responsive to the at least one property of the specimen during use;

a local processor coupled to the measurement device, wherein the local processor is configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to further process the one or more output signals to determine the at least one property of the specimen during use.

6632. A method for determining at least one property of a specimen, comprising:

performing one or more steps of a lithography process on the specimen in a lithography track;

generating one or more output signals responsive to the at least one property of the specimen with a measurement device, wherein the measurement device is coupled to the lithography track; and

processing the one or more output signals to determine the at least one property of the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.